

15ppm Bilge Alarm

# **FOCAS-2000**

Oil Concentration Detector

## **Instruction Manual**

Read this instruction manual thoroughly before use to operate the product safely by following precautions.  
Be sure to keep it in an easy-to-access place so as to refer to it whenever necessary.

1. General	
1-1. Introduction	page. 2
1-2. Product Features	page. 2
1-3. Safety precautions	page. 3
2. Specifications	
2-1. Product Specification	page. 3
2-2. External dimensions and component names	page. 4
2-3. Internal layout figure and terminal block	page. 5
2-4. Relay contact output, alarm lamp movement view	page. 6
3. Connecting pipes	
3-1. Mounting space	page. 7
3-2. Precautions for piping work	page. 7
4. Preparing for Operation	
4-1. About items displayed on the screen	page. 8
4-2. Outline of operating conditions	page. 9
4-3. Preparing for Operation	page. 9-10
5. Operation	
5-1. Test-operation method by the Manual operation function	page. 11-12
5-2. Test-operation method by the Automatic operation function	page. 13
5-3. Function of judging whether the detection tube is clean	page. 14
6. Setting	
6-1. Tabulated list of menu items	page. 15
6-2. Time correction of the clock	page. 16
6-3. Various settings	page. 17-18
7. Operation and Maintenance	page. 19
8. Maintenance and Checking	
8-1. Testing function	page. 19-24
8-2. Maintenance	page. 25-27
8-3. Viewing the operational log	page. 28-30
8-4. Cleaning the sensor (brush washing)	page. 31
8-5. Cleaning the filter	page. 31
8-6. Checkup and replacement timing of desiccant (silica gel)	page. 32
8-7. Replacing the clock backup battery	page. 32
8-8. Replacing the operational log memory card	page. 33
8-9. Replacing the fuses	page. 33
9. Troubleshooting	page. 34-36
10. Service parts • Option parts	page. 37
11. Request	page. 37
12. Display of groups and description of statuses	page. 38

# 1. General

## ■ 1-1. Introduction

Thank you for selecting the 15-ppm bilge alarm (oil concentration detector) Model FOCAS-2000.

The bilge alarm (oil concentration detector) Model FOCAS-2000 has been developed based on market needs integrated with Fellow Kogyo's proprietary technologies.

This product meets the IMO resolution MEPC. 107(49).

Be sure to read this instruction manual. Store this manual always in a place of easy read.

**IMPORTANT**

**! Be sure to read the following**

The product is delivered with the precision and type approval certificates attached. Store them with caution.

Validity period of accuracy assurance is 5 years. MEPC.107(49) requires the manufacturer or a party approved by the manufacturer to verify the accuracy of the product and take the IOPP certificate renewal examination within 5 years. (Replacement with a calibrated product is allowed.) Be sure to request the agent or manufacturer for accuracy verification. Do not use the equipment for facilities relating to human safety. We will not be responsible for any outcome resulted from such use.

1. Checking after shipment must be performed in accordance with the IMO regulations by a person having skills certified by Fellow Kogyo.
  - Operating history is stored in the operation record memory in accordance with MEPC 107(49) Directives.
  - It is a user's duty to store the record data for 18 months.
  - Before the free space of the operational log memory becomes insufficient, this machine tells it on the LCD display.  
When the free space of the operational log memory becomes insufficient, the machine may be disabled to run.  
To run the machine, you must replace the operational log memory by a new one.
  - The old operational log memory must be kept aside for at least 18 months from the date of replacement.  
For more information, call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.
2. As this equipment is a certified one, no modification is allowed.  
In addition, never break the equipment seal, as such an act is deemed as fraudulent.
3. This equipment is warranted for one year after delivery. In case any failure responsible to Fellow Kogyo is experienced during the period, the pertaining part or component shall promptly be replaced or repaired.

## ■ 1-2. Product Features

- The operation switches are arranged on the panel surface, enhancing the operability.
- The sensor unit and the electromagnetic valve are structured to be individually replaceable, enhancing the maintainability.
- Sample water pressure is supplied from the oil separator for automatically operation the equipment.
- The LCD display shows an error code and its information when the machine does not run normally.  
You can easily check the machine state.
- The operation recording information including trouble alarms is stored in an operational log memory card and can be checked as required.
- When effecting every-5-years renewal of precision certificate, you can choice as follows,
  - Replace calibrated sensor unit (sold separately) on board and use it.
  - Precision test by maker or authorized person by maker.

## 1. General

### ■ 1-3. Safety precautions



- Shut off the power when undertaking construction of the equipment (installation, piping and wiring).  
Fire, electric shock or injury may be caused due to a short circuit.



- Do not machine, disassemble or modify the product. An accident, fire, electric shock, electronic part damage or burnout may be caused. If the product has been modified, we cannot take charge of repair.
- Do not use the product when it is faulty. An accident such as electric shock and fire may be caused. Stop the operation at once and repair the product.



- This machine is not provided with a power switch for the primary power supply.  
Be sure to install a power switch at the power supply source.
- Do not leave the product in a subzero environment in the status where sample water or fresh water remains in the sample water detection tube. The sample water detection tube will be broken by freezing, resulting in a failure.
- Never feed water contaminated with oil or impurities directly into the detection tube in the sensor unit. Since this machine is a precision equipment, a malfunction or impossibility of measurement may be caused by contaminated detection tube.
- Please use the battery properly without making mistakes in terms of orientation of polarity.  
Equipment might break down or be heated which leads to ignition.
- Never use the operational log memory card of this oil concentration detector (FOCAS-2000) for the existing oil concentration detector (FOCAS-1800). If used, its data will be lost. We cannot assure and recover any operational log data lost by the use in the existing oil concentration detector. By the way, FOCAS-2000 can read the operational log memory card of FOCAS-1800.

## 2. Specifications

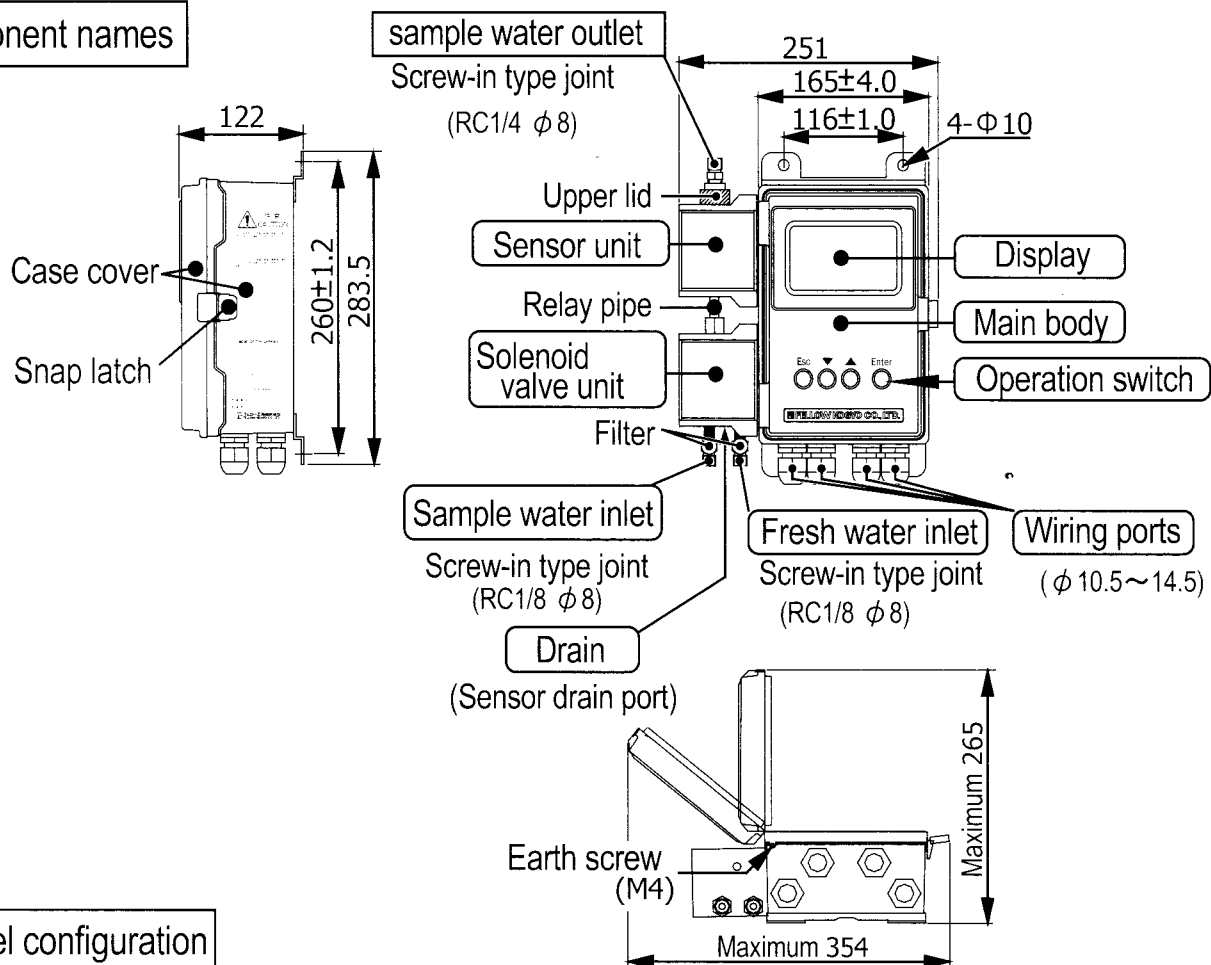
### ■ 2-1. Product Specification

Application	Bilge concentration monitor (bilge wastewater)		
Measurement method	Optical continuous measurement		
Operation method	Automatic operation using sample water pressure		
Response time	5sec or less, (comply with MEPC107(49))		
Power supply / power consumption	AC90 ~ 240 V 50 ~ 60 Hz 20 VA or less		
Measurement range	30ppm in full scale		
Measurement accuracy	±5ppm or less (at 15ppm)		
Conditions on samplewater	pressure: 0.03 ~ 0.3MPa flow rate: 0.2 ~ 3 L/min water temperature: +2 ~ +45°C		
Fresh water pressure for washing	0.03 ~ 0.6Mpa		
Material measured and identified	light oil 10ppm in 100ppm iron oxide solution		
Battery for clock and lifetime	Lithium battery (CR2450) about 2 years (recommended maker : FDK Energy Co Ltd. Japan)		
Service temperature・humidity	0 ~ 50°C, 5 ~ 90%RH, no dew condensation		
Bearable vibration	2Hz to 13.2Hz, amplitude ±1.0mm, 13.2Hz to 80Hz, acceleration ±0.7G		
Maximum measurement angle of inclination	Within 22.5° in each direction		
Indications and Outputs	Indication of oil concentration : displayed in 24 digits 2 lines, alpha-numeral Power lamp : Green LED lighting, Alarm lamp : Red LED blinks Alarm1、Alarm2、VALVE Each contact output, REC Analog output		
Terminal specification /oil alarm operating point	VALVE (For three-way valve)	Specification A Contact output: 1 circuit, 1B contact (max. 250 VAC 2 A), supply voltage output Specification B Contact output: 1 circuit, 1C contact (max. 250 VAC 2 A), supply voltage output	
	Alarm1 (5~15ppm variable)	1 circuit for contact output, C contact (Max AC250V 2 A)	Delay time: 0 to 5 s
	Alarm2 (5~15ppm variable)	1 circuit for contact output, C contact (Max AC250V 2 A)	Delay time: 0 to 600 s
	RECOut (4-20mA output)	DC4-20mA (0-24mA)	line resistance less than 750Ω
Operation recording function	Power-on and -off, output and release time of respective alarms (record memory: 2 Mbit), conformant to MEPC 107(49)		
Piping bore	Inlets of sample water and fresh water, and drain port: Outer diameter of φ8 or φ10 with copper tube ring joints		
Cable gland	4 pcs (φ10.5 ~ φ14.5)		
Water-proof grade	IP = 54		
External dimensions , weight	W = 251mm × H = 283.5 mm × D = 122 mm, Total weight : approx. 4.8 kg (excluding accessories)		

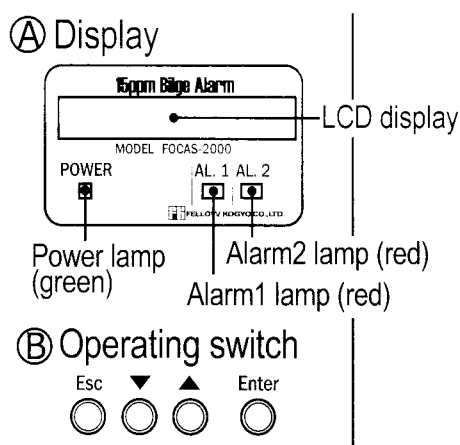
## 2. Specifications

### ■ 2-2. External dimensions and component names

#### Component names



#### Panel configuration



#### ① Display

<b>POWER</b>	Green lamp lights when applying current.
<b>AL. 1</b>	Red lamp blinks when oil alarm is activated or the unit is defective.
<b>AL. 2</b>	

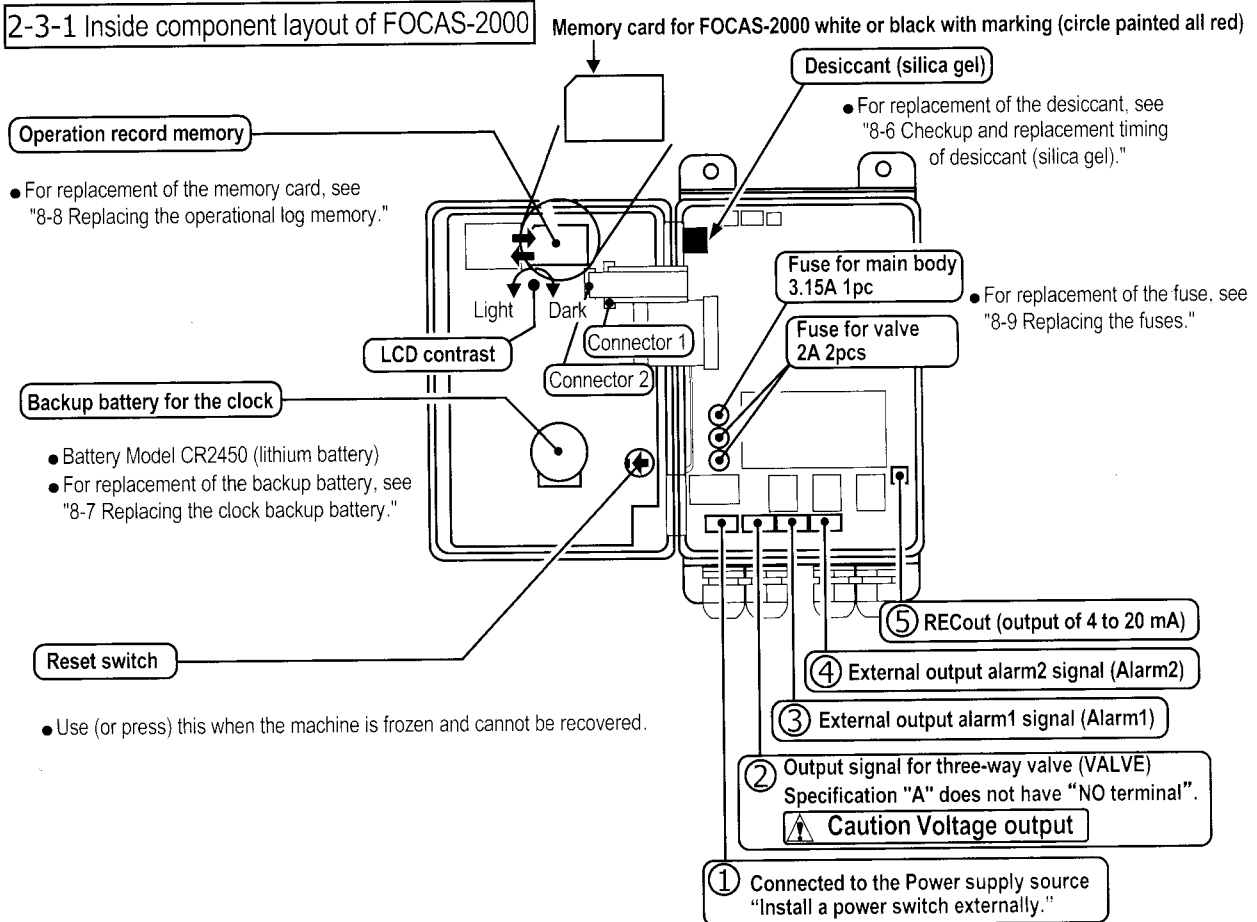
#### ② Operation switch

<b>Esc</b>	Used to set items and select a function excluding the Auto Run function.
<b>▼ ▲</b>	Used to change display items and select or change set values.
<b>Enter</b>	Used to determine and execute a setting.

## 2. Specifications

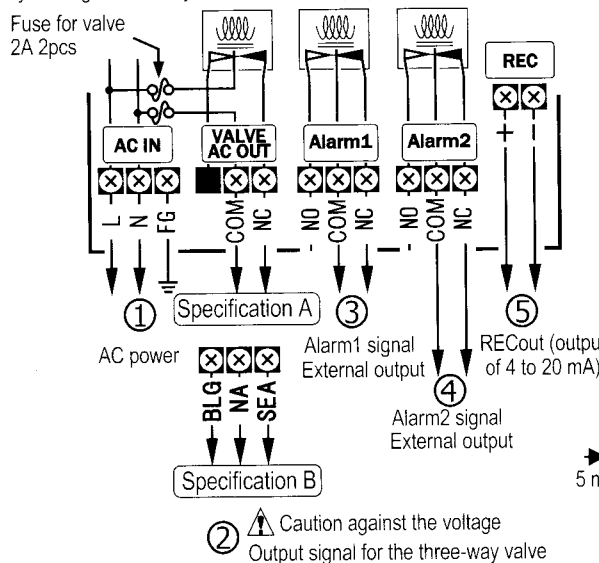
### 2-3. Internal layout figure and terminal block

#### 2-3-1 Inside component layout of FOCAS-2000



#### 2-3-2 Terminal block and FOCAS-2000 inner connection

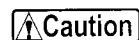
- All terminal blocks are removable.
- All symbol figures of relay show conditions applying current.



#### How to connect cables with the terminal block (reference)

- Single-wired cables are recommended.
- Loosen the screw with a flat-head screwdriver, insert a cable, and then tighten the screw.
- Connecting work is possible with the terminal block being removed (the terminal block is removable type).
- The relays with the cables being connected are installed on the terminal block.

Peel the wire covering by 5 mm at most.  
The wire to be used is AWG12 to 24 or equivalent.  
Use AWG16 to 24 or equivalent only for RECut.



**Caution**  
Improper connection might cause failure.

## 2. Specifications

### ■ 2-4. Relay contact output, alarm lamp movement view

Terminal name / operation conditions etc		① Power supply source		Without supply	With supply							
					Operational status		Standby	During operation		Washing	Setting	Defect error
※1 ②	Specification A	Across the relay terminals (Applied voltage output)	COM-NC	OFF	Standby	Warm up	Under set density valve	More than set density value	Over30ppm Over scale	During washing	Setting During setting	Defect error
	Specification B	Across the relay terminals (Applied voltage output)	BLG-NA NA-SEA	OFF	ON (Voltage output)	OFF	ON (Voltage output)	ON (Voltage output)				
※3 ③	Alarm1 Alarm signal 1	between relay terminal	NO-COM	ON	OFF	※2	OFF	ON	ON(Blinking)			
		Alarm1 lamp (AL1)	COM-NC	OFF	ON	ON	OFF	OFF				
※3 ④	Alarm2 Alarm signal 2	between relay terminal	NO-COM	ON	OFF	※2	OFF	ON	ON(Blinking)			
		Alarm2 lamp (AL2)	COM-NC	OFF	ON	ON	OFF	OFF				
⑤	RECout (output of 4 to 20 mA)	Default value (At factory shipment)	Unit (mA)	0 (No output)	0	4	※4 Concentra- tion monitor	※4 Concentra- tion monitor	20	4	0	0
		Arbitrary setting		Arbitrary setting is possible via panel switch operation See Item 6-3-1 "Setting data and ranges" under Section 6 "Setting" ※2 During power outage and Warm up is in-possible to arbitrary setting.								

※1 Terminal bases are different. (See "2-3-2 "Terminal Base Alignment and FOCAS-2000 inner connection.")

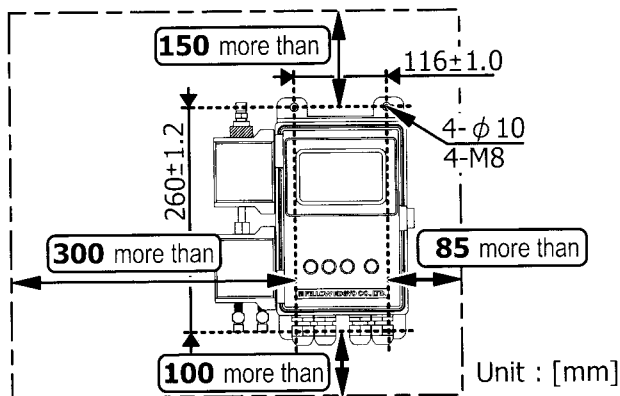
※2 You can set to synchronize alarm signals output from contacts with alarm lamps by operating the panel switch (when you set, wash, and warm up the detector).

※3 Alarm1 and Alarm2 values can be set individually (in ppm) in the range of 5 to 15 ppm.

※4 RECOut (4-20mA output) outputs a direct current of 4 to 20mA in synchronism with the measured oil concentration value.

### 3. Connecting pipes

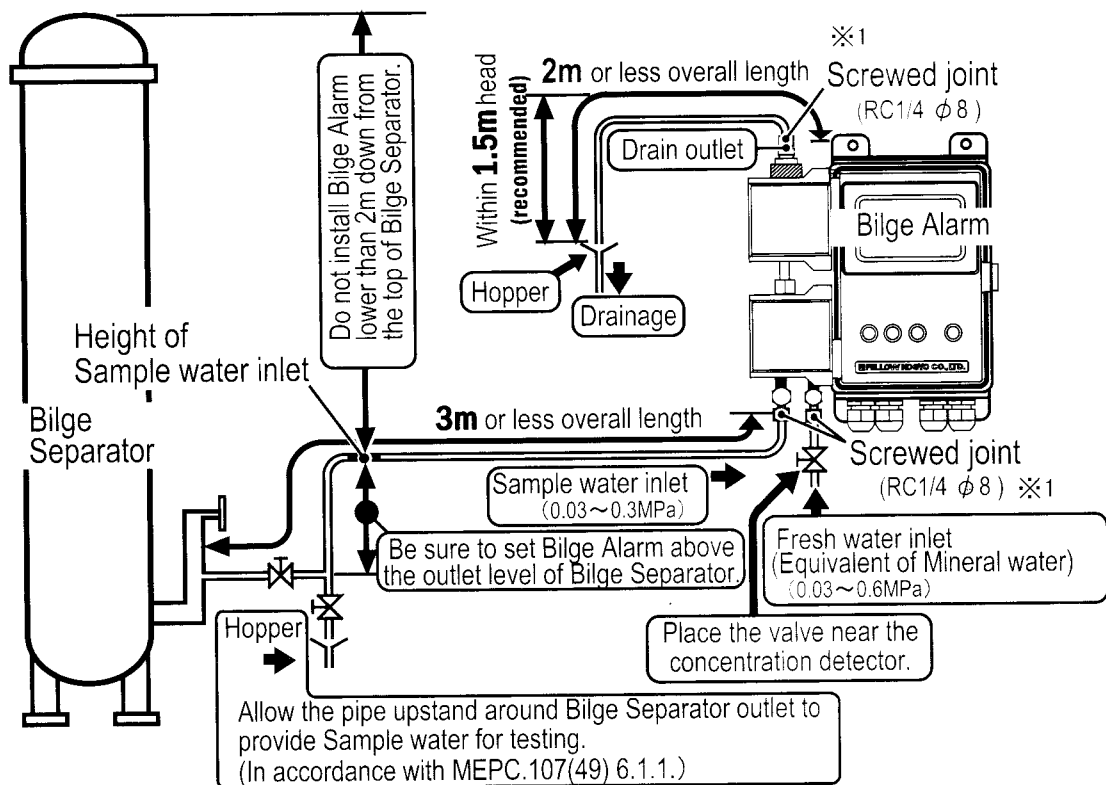
#### ■ 3-1. Mounting space



#### ■ Installation

- Set up this unit vertically
- Fix 4 setup holes with bolt firmly
- Use only bolts.
- A distance of at least 210 mm is required on the left.  
This amount is required for replacing the sensor unit or solenoid valve unit.

#### ■ 3-2. Precautions for piping work



#### Sample water and fresh water pipes

- Use fresh water equivalent of mineral water, which is indispensable for sensor correction.
- In order to prevent dust contamination from fresh water line, please be sure to carry out cleaning of the line.
- Tubes to be connected to the sample water inlet, fresh water inlet, and outlet should be copper tubes of 8 mm in outer diameter. ※1
- Normal operating pressure: 0.03 to 0.3 MPa for sample water and 0.03 to 0.6 MPa for fresh water
- ※1 When the oil concentration detector is shipped from the factory, its connection ports are for tubes of 8 mm in diameter (as standard). Use an accessory reducing joint to connect a 10mm-dia. copper tube. Apply seal tape to the threaded part of the copper tube before coupling the tube to the port.

#### Restrictions on piping

- The length from the sample water outlet to the end of piping shall be 2 m or less and the fall shall be within 1.5m. Be sure to provide hoppers.
- Piping length between Bilge Separator and Bilge Alarm shall be 3m or less. Bilge Alarm shall be set above the Outlet height of Bilge Separator. Do not install Bilge Alarm lower than 2m below the top of Bilge Separator. Operation pressure of Bilge Alarm is 0.03Mpa – 0.3Mpa. In consideration of recommended pressure for Bilge Separator, adjust the operation pressure.

#### Caution

Be sure to follow the above instructions to run the oil concentration detector normally.



## 4. Preparing for Operation

### ■ 4-1. About items displayed on the screen

#### ● Standby state

State	Display item	Description
Shows the current state and the current time when the oil concentration detector is standing by.		The oil concentration detector enters the standby state when the pressure at the sample water inlet is lower than 0.03 MPa.

#### ● Automatic operation

State	Display item	Description
Shows these items when detecting the sample water inlet pressure after operation the bilge separator.		The oil concentration detector automatically starts to run when detecting a sample water inlet pressure of 0.03 MPa or higher.
Shows "warm-up" and a remaining warming-up time.		Waits for a specified warm-up time (in seconds) until the state of sample water becomes stable for measurement. The bilge cannot be drained independently of where the oil alarm point exists.
Example of display during "operation" Oil concentration < Alarm1 oil alarm point		The "AL1" alarm lamp is off when the oil concentration is less than Alarm1 oil alarm point.
Example of display during "operation" Oil concentration ≥ Alarm1 oil alarm point		The "AL1" alarm lamp blinks at the same time. The bilge does not drain.

#### ● Washing

State	Display item	Description
Shows these items when the washing is in progress. Shows the remaining washing time (in seconds).		Feed fresh water into the detection tube to wash the inside of the tube when the sample water pressure goes under 0.03 MPa after the bilge pump stops.

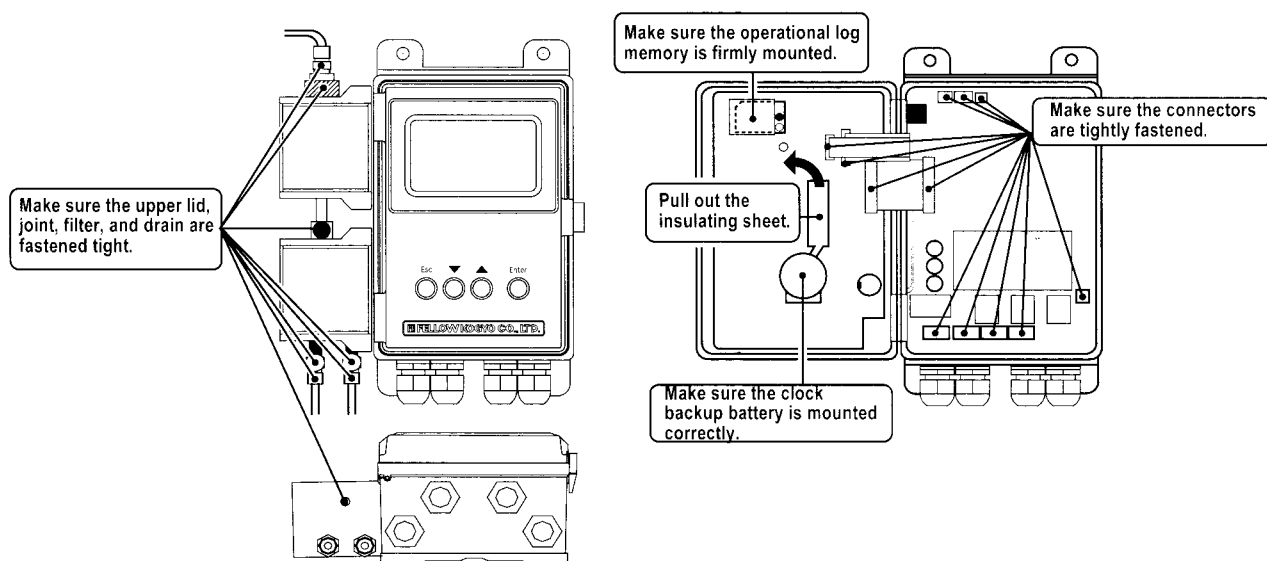
## 4. Preparing for Operation

### ■ 4-2. Outline of operating conditions

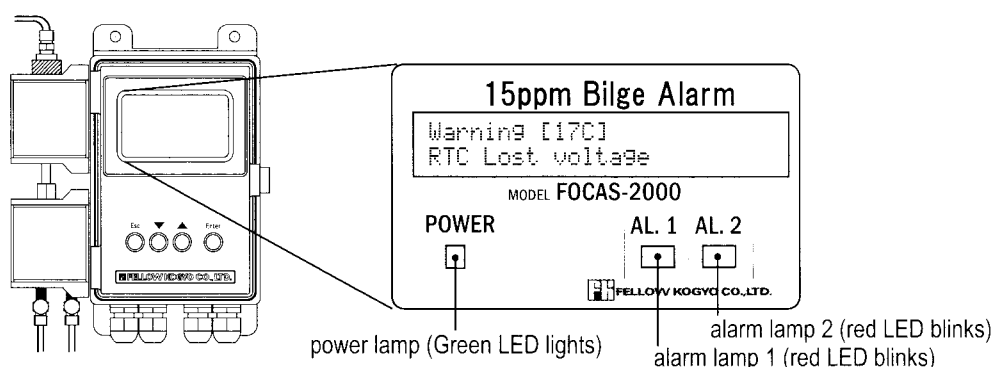
- The FOCAS-2000 oil concentration detector automatically starts to operate when detecting a water pressure of 0.03 MPa or more at the sample water inlet.
- After starting to run, the oil concentration detector waits for a preset time (warm-up time) until the sample water state becomes stable so as not to detect a residue in the area between the sample water pipeline and the detection tube. In this state, the three-way valve output signal is off and the bilge does not drain.
- The oil concentration detector has two oil alarm points (Alarm1 and Alarm2). You can set an alarm point (in ppm) in the range of 5 to 15 ppm.
- The Alarm1 oil alarm point is in synchronism with the three-way valve output signal. When the oil concentration is less than the specified oil alarm point, the bilge drains. By the way, when the oil concentration exceeds the oil alarm point, the three-way valve output signal is output to immediately stop drainage of the bilge independently of the setting of Alarm1 oil alarm delay.
- When the water pressure at the sample water inlet falls under 0.03 MPa, the oil concentration detector stops operation, feed fresh water into the detection tube for a preset time period to keep it clean and leave no residue in the tube, and enters the standby state.

### ■ 4-3. Preparing for Operation

- Be sure to set the clock right before using the oil concentration detector. If not, the oil concentration detector cannot run. (When the clock is not set, an alarm is output. The alarm is reset, when the clock is set.)
  - If the oil concentration detector has any error, "Warning [xxx] or Error [xxx]" is displayed on the screen portion of the oil concentration detector body.
  - The inside of the external pipe may be fouled with sediment. Be sure to flush clean the pipe inside before connecting the pipe to the oil concentration detector.
1. Before turning on the oil concentration detector, be sure to check pipe joints and cable connection to the terminal base and make sure they are firmly tightened.
  2. When shipped out from the factory, the clock backup battery is insulated with an insulating sheet. Pull it out to enable the battery.
  3. Check and make sure the clock backup battery and the operational log memory card are mounted firmly.



4. Turn on power to the oil concentration detector. Make sure the "POWER" lamp (green) lights.)
5. When the oil concentration detector is turned on, the alarm lamps blink and the LCD screen shows the following.



6. Set the clock right. See the next page.

## 4. Preparing for Operation

Set the clock right.

```
Warning [17C]
RTC Lost voltage
```

A warning is displayed to indicate "Set the clock."  
Press "Enter."

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

In this state, you can set the clock.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Press "Enter" to set a year. The cursor blinks at a digit you can enter a value.  
Press "▲" to select a value. Press "Enter" after selecting a value.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Press "▲ ." The cursor moves to a month entry digit.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Press "Enter" to set a month. The cursor blinks at a digit you can enter a value.  
Press "▲" to select a value. Press "Enter" after selecting a value.

Repeat the above to set hours, minutes, and seconds.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Set seconds after setting minutes.  
Press "▲ ." The cursor moves to a second entry digit.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Press "Enter" to set seconds. The cursor blinks at a digit you can enter a value.  
Press "▲" to select a value. Press "Enter" after selecting a value.

```
Clock Adjustment
ENT 20:xx/xx/xx  xx:xx:xx
```

Press "▲ ." The cursor moves to the "ENT" position.  
Press "Enter."

```
Standby
20:xx/xx/xx  xx:xx:xx
```

"Standby" and the current time are displayed on the screen.  
Check and make sure the "seconds" value of the clock is changing.

With this, the preparation for operation (initial setting) is completed.

## 5. Operation

■ Be sure to confirm the items below.

- Check and make sure the installation, piping, wiring, terminal base connection, and water pressure (0.03 MPa or higher at the sample water inlet) once more.
- If the sample water pressure of 0.03 MPa or higher cannot be obtained at the sample water inlet, you can perform simple test operation of the oil concentration detector. See "5-1 Test operation method by the Manual Operation." (The electromagnetic valve for sample water opens during test operation. Provide a valve before the sample water inlet to close the sample water line from the bilge pump.)

■ 5-1. Test operation method by the Manual operation function



- Prepare mineral water.
- The upper lid and the drain valve are opened and closed. They must be closed firmly when closed.
- Close the valve provided before the sample water inlet.

■ Use the Manual Operation function to test-operation the oil concentration detector after installing and constructing it or in the following cases:

- when the bilge separator is disabled but you want to execute an alarm operation test including three-way valve output signals.
- when a pressure of 0.03 MPa or higher cannot be applied to the sample water inlet

■ The Manual Operation enables you the following:

- The manual operation is implemented for 5 minutes independently of the setting state of the pressure switch. When the manual operation ends, "Main Menu" returns. And then the oil concentration detector enters the standby state.
- The alarm operation test can be executed when the concentration is less than the specified oil alarm point during manual operation.

■ Manual test operation procedure

```
Standby.
20:xx/xx/xx xx:xx:xx
```



```
Main Menu
TEST Mode
```



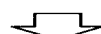
```
TEST Mode
Manual running
```



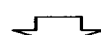
```
Detect Pressure
20:xx/xx/xx xx:xx:xx
```



```
Manual running
Warning up. xxx
```



```
Manual running 00:00:00
Valve ON 00 PPM
```



Make sure the oil concentration detector is in the standby state. ("Standby" and the current time are displayed on the screen portion of the oil concentration detector.)

Close the valve provided before the sample water inlet.

Open the upper lid of the sensor unit and the drain valve to empty the sensor unit. Close the drain valve and feed mineral water into the detection tube (to about 80% of the detection tube) from the top of the sensor unit (from which the upper lid is removed), and close the upper lid. Keep on pressing "Esc" for two seconds longer in the standby state. Enter "Main Menu."

Press "▲" twice. "Test Mode" is displayed under "Main Menu."

Press "Enter." A screen appears to select respective TEST function items.

"Manual running" is displayed to execute the manual operation.  
Press "Enter."

This screen is displayed for about 5 seconds and the manual operation starts.

"Warning up" is displayed on the bottom line of the screen.  
The remaining time (in seconds) is displayed to the right side of "Warning up."  
(Press "Esc" for 5 seconds or longer to stop the manual operation halfway.)

Shows an oil concentration during operation. This screen shows the state of the three-way valve output signal and the measured oil concentration.

When the oil concentration is less than the oil alarm point (when "Alarm" is not output), you can execute an alarm test including the three-way valve output signal.

Press "Enter" for 2 seconds or longer. The alarm test starts. (Continued to the next page.)

5. Operation

■ Continued from the preceding page. (Manual test-operation procedure)

Manual run sim   xx:xx:xx  
Valve ON       xx PPM

Manual run sim   xx:xx:xx  
Valve OFF       xx PPM

Manual running   xx:xx:xx  
Valve ON       xx PPM

Manual running  
Washing       xxx

Manual running  
Wait Stable     xx

TEST Mode  
Manual running

Main Menu  
TEST Mode

Standby.  
20xx/xx/xx   xx:xx:xx

When the alarm test starts, the oil concentration detector artificially increases the oil concentration to enable the alarm test. "sim" appears in the center of the top line of the screen. The ppm value "x" is increased by one each time you press "▲." (You can reduce the value similarly by pressing "▼" but cannot reduce the value under the current measured concentration value.) When the measured oil concentration exceeds the oil alarm point (Alarm1 and Alarm2), the oil concentration detector enters the alarm state and turns off the three-way valve output signal. You can confirm the alarm operation. Both AL1 and AL2 lamps blink. The alarm test is disabled when the oil concentration of the sample water goes over the oil alarm point in the test.)

Press "Esc" after confirming the alarm test. About 5 minutes later with "Esc" unpressed, "sim" disappears from the screen. The operation ends. "Main Menu" returns. And then the oil concentration detector enters the standby state.

"sim" disappears and "Manual running" returns. This screen shows the ON/OFF state of the three-way valve output signal and the measured oil concentration. Press "Esc" for 2 seconds and unpress it.

The operation ends and the oil concentration detector enters the washing state.

The remaining time (in seconds) is displayed to the right of "Washing."

When the washing operation ends, the oil concentration detector waits for judgment of whether the inside of the detection tube is clean. "Wait Stable" appears and the remaining time (in seconds) is displayed to the right of "Wait Stable."

After the washing operation ends, "TEST Mode" appears to select "Manual running" of the TEST function. Press "Esc"

"Main Menu" returns. Press "Esc."

"Standby" returns.

With this, the test operation by the Manual Operation ends.

## 5. Operation

### ■ 5-2. Test operation method by the Automatic operation function

- Use the Automatic Operation to test-operation the oil concentration detector after installing and constructing it or in the following cases:
  - when you want to operation the bilge pump and execute an alarm test including the three-way valve output signal.
  - when a water pressure of 0.03 MPa or higher can be applied to the sample water inlet.
- The Automatic Operation enables you the following:
  - When a water pressure of 0.03 MPa or higher is applied to the sample water inlet, the oil concentration detector always starts operation. When detecting a low water pressure (lower than 0.03 MPa) for a preset time period, the oil concentration detector ends the washing operation and returns to the standby state.
  - The alarm operation test can be executed when the concentration is less than the specified oil alarm point during auto operation.
- Test operation procedure by the Automatic Operation

```
Standby.
20xx/xx/xx  xx:xx:xx
```

Check and make sure the bilge separator is ready to run or when both sample water and fresh water can be supplied to the oil concentration detector. In the standby state while "Standby" and the current time are displayed on the screen, the oil concentration detector automatically starts operation when the bilge pump and the bilge separator runs or sample water of 0.03 MPa or higher is supplied to the sample water inlet.

```
Detect Pressure
20xx/xx/xx  xx:xx:xx
```

This screen is displayed for about 5 seconds and the auto operation starts.

```
Operating.
Warming up.  xxx
```

"Warming up" is displayed on the bottom line of the screen.

The remaining time (in seconds) is displayed to the right side of "Warming up."  
(Press "Esc" for 5 seconds or longer to stop the auto operation halfway.)

```
Operating.  xx:xx:xx
Valve ON    xx PPM
```

However, the oil concentration detector starts to run again about 5 seconds later when the bilge pump and the bilge separator is running or when the sample water pressure at the inlet is 0.03Mpa or higher.

Shows an oil concentration during operation. This screen shows the state of the three-way valve output signal and the measured oil concentration.

When the oil concentration is less than the oil alarm point (when "Alarm" is not output), you can execute an alarm test including the three-way valve output signal.

**Press "Enter" for 2 seconds or longer. The alarm test starts.**

When the alarm test starts, the oil concentration detector artificially increases the oil concentration to enable the alarm test. "sim" appears in the center of the upper row of the screen. The ppm value "x" is increased by one each time you press "▲".

(You can reduce the value similarly by pressing "▼" but cannot reduce the value under the current measured concentration value.)

When the measured oil concentration exceeds the oil alarm point (Alarm1 and Alarm2), the oil concentration detector enters the alarm state and turns off the three-way valve output signal. You can confirm the alarm operation. Both AL1 and AL2 lamps blink. The alarm test is disabled when the oil concentration of the sample water goes over the oil alarm point in the test.)

Press "Esc" after confirming the alarm test.

5 minutes later with "Esc" unpressed, "sim" disappears from the screen and "Operation" returns.

```
Operating. sim  xx:xx:xx
Valve OFF    xx PPM
```

"sim" disappears and "Automatic operation" returns. This screen shows the ON/OFF state of the three-way valve output signal and the measured oil concentration.

```
Operating.  xx:xx:xx
Valve ON    xx PPM
```

```
Operating.
Washing  xxx
```

When the bilge pump and bilge separator stop and the water pressure at the sample water inlet goes below 0.03Mpa, the oil concentration detector ends operation and moves to the washing process. The remaining time(in seconds) is displayed to the right of "washing."

```
Operating.
Wait Stable  xx
```

When the washing operation ends, the oil concentration detector waits for judgment of whether the inside of the detection tube is clean. "Wait Stable" appears and the remaining time (in seconds) is displayed to the right of "Wait Stable."

```
Standby.
20xx/xx/xx  xx:xx:xx
```

After judging the detection tube is clean, the oil concentration detector returns to the standby state.

With this, the test-operation check by the Automatic Operation is completed.

## 5. Operation

### ■ 5-3. Function of judging whether the detection tube is clean

This function judges whether the detection tube is clean when the washing process ends after manual/auto operation.

#### ■ When the washed detection tube is not clean

When it is judged the detection tube is not clean, "Warning: cell too dirty" is displayed on screen.

When this message is displayed, manually wash the detection tube (see "8-2-1"), shut off the primary power supply and clean the sensor (with brush, see "8-4"). After that, the primary power supply again and perform manual running using mineral water (see "8-1-1").

Since stain level of sample water detection tube is judged after manual operation is finished, this message disappears when the detection tube is clean. If the message is still displayed, repeat the above steps. (clean the sensor (with brush, see "8-4"), manual operation using mineral water (see "8-1-1") and judging the stain level of sample water detection tube).

```
Warning:cell too Dirty
20xx/xx/xx xx:xx:xx
```

#### ■ When the inside of the detection tube is too dirty to be measured

"Warning [112]" is displayed on screen when the inside of the detection tube is too dirty to be measured.

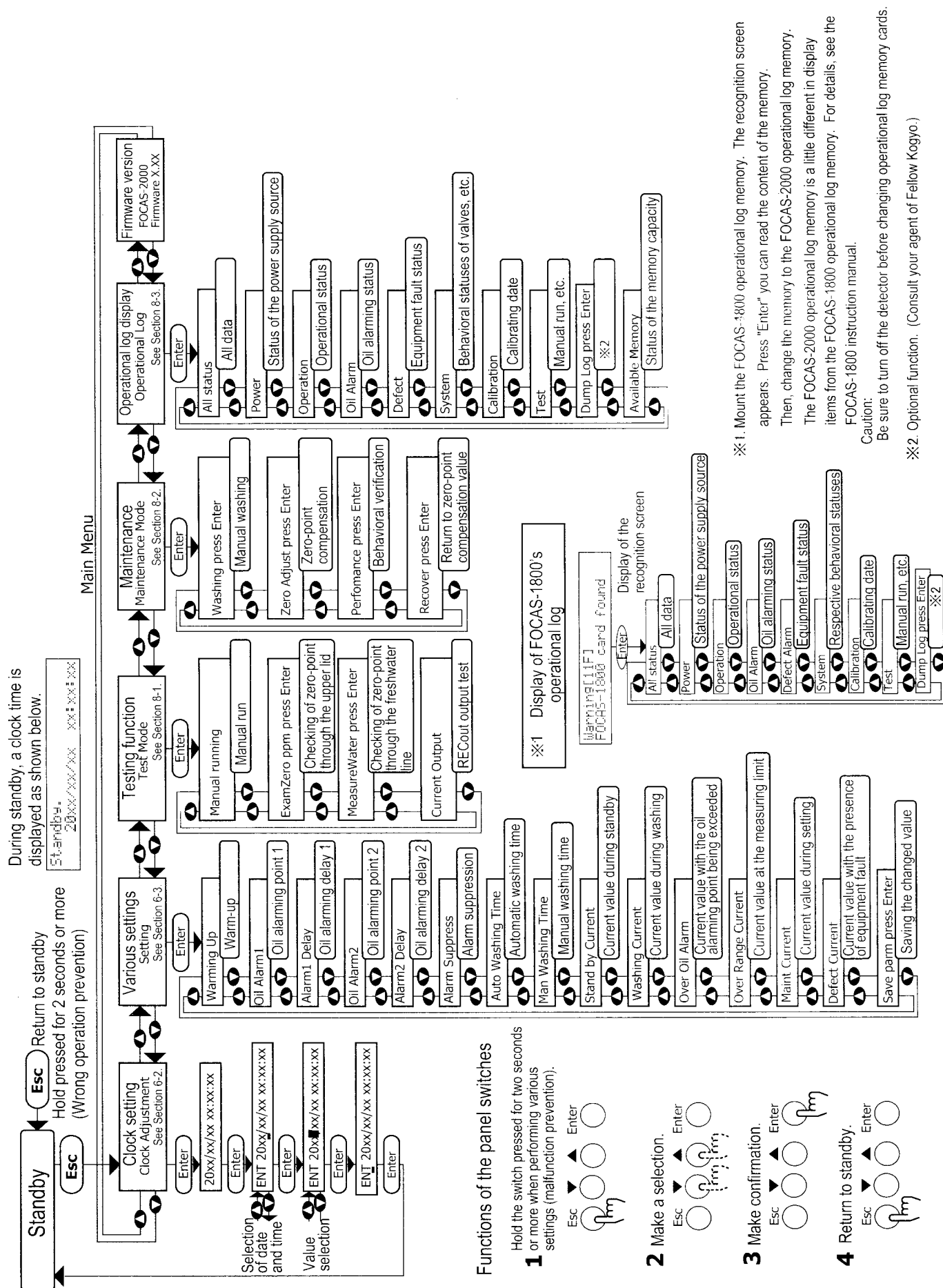
Clean the sensor (with brush, see "8-4") to maintain the performance of the detector. It is necessary to temporarily cancel the Warning state to enable sensor cleaning (with brush, see "8-4"). Press "Enter." Then display changes to "Warning: cell too Dirty." Shut off the primary power supply, and clean the sensor (with brush, see "8-4"). After that, supply the primary power supply again and perform manual operation using mineral water. (see "8-1-1") Since stain level of sample water detection tube is judged after manual operation is finished, this message disappears when the detection tube is clean. If the message is still displayed, repeat the above steps. (cleaning the sensor (with brush, see "8-4"), manual operation using mineral water (see "8-1-1") and judging the stain level of sample water detection tube).

```
Warning[112]
Adhesion of dirt
```



- When warning message still remains on screen after the sensor cleaning (with brush), the fresh water may be contaminated. Do not use industrial water or circulating reclaimed water in the fresh water line since such water may be cloudy or contaminated.
- This oil concentration detector is equipped with a "Zero-point compensation" function. However never use this function when "Warning: cell too dirty" or "Warning [112]" (to alarm dirtiness of sample water detection tube) is displayed on screen. If used, a detector trouble may occur.

### ■ 6-1. Tabulated list of menu items



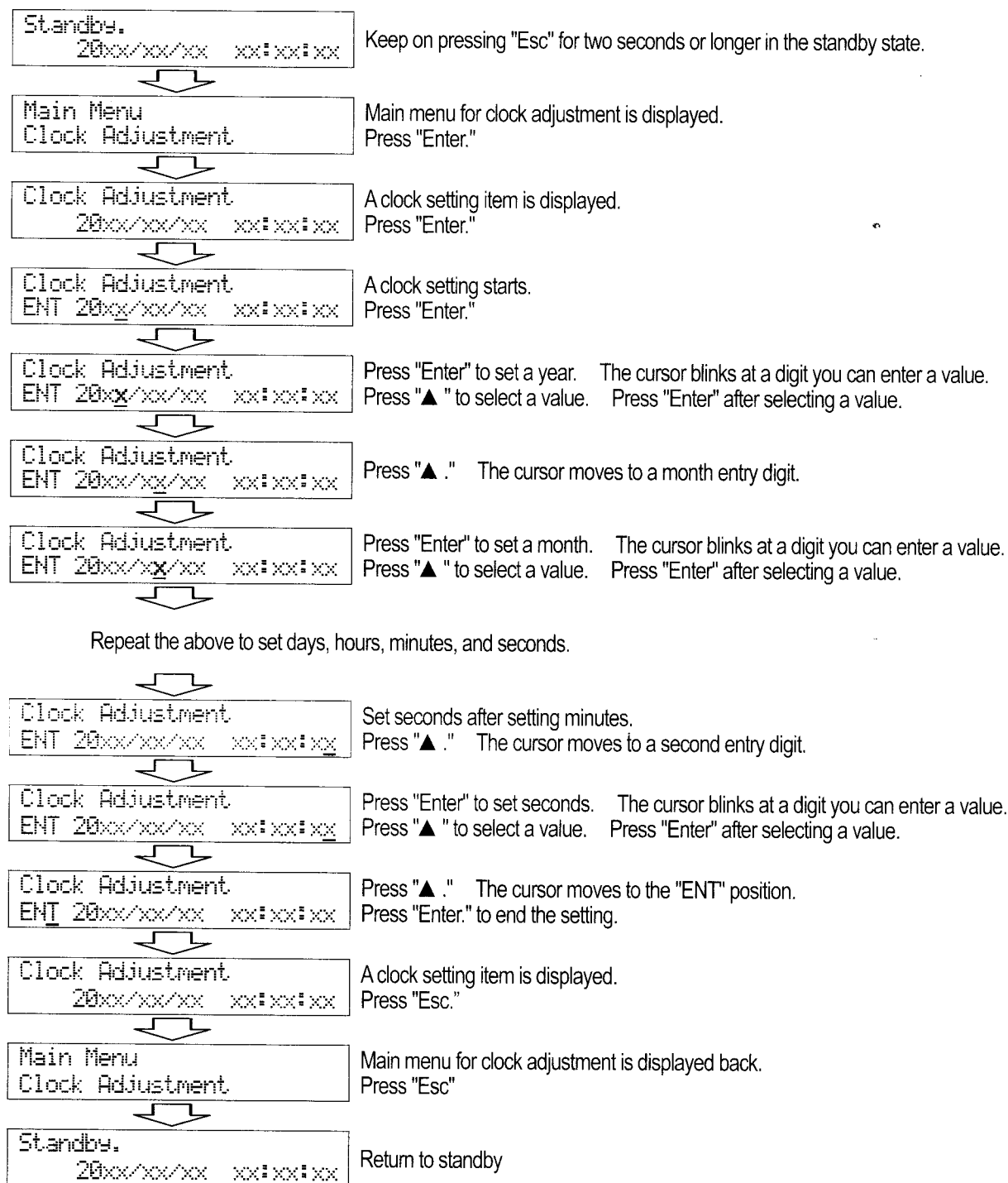


## 6. Setting

- Various settings, testing function, operational log viewing and more can be done by using the operation switch.
- The switch is ineffective during operation. Ensure the status being in standby.
- During setting, automatic operation is disabled even if the pressure switch is set at the specified pressure (0.03 MPa) or higher.

### ■ 6-2. Time correction of the clock (Clock Adjustment)

- On the Clock Adjustment screen, you can set the clock of the oil concentration detector with the radio time signal.



With this, the clock setting is completed.

## 6. Setting

### ■ 6-3. Various settings (Setting)

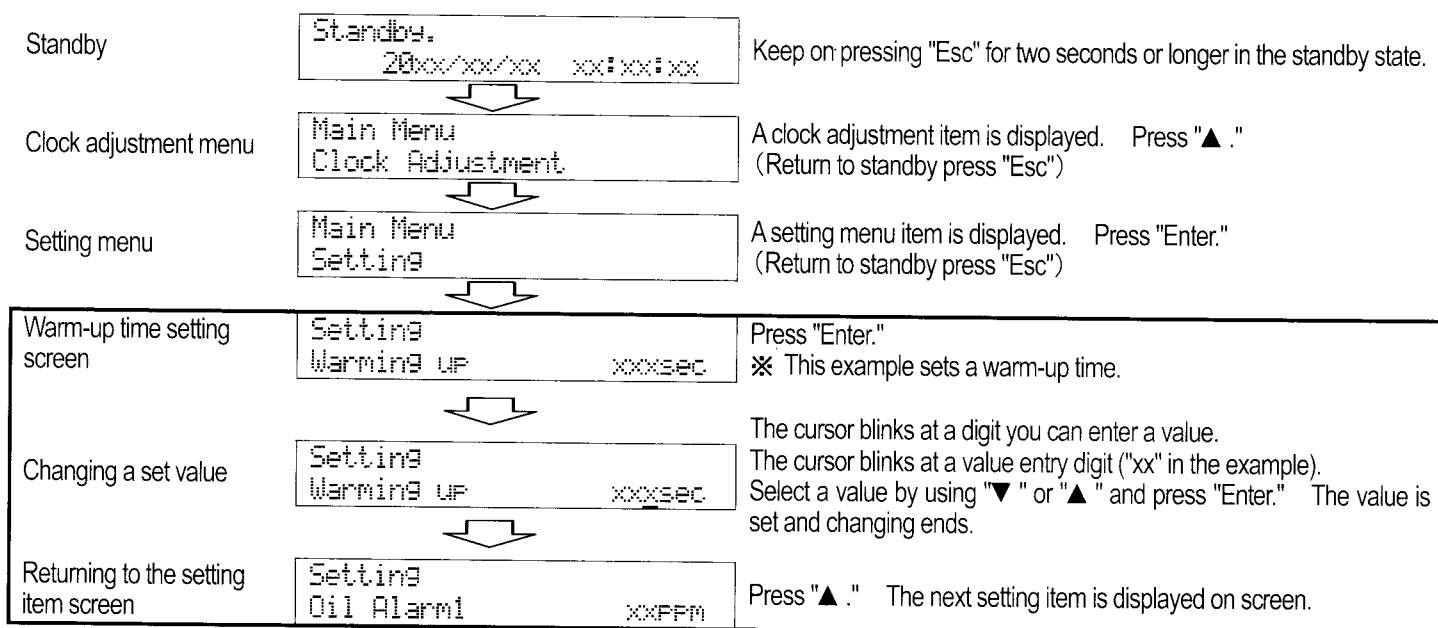
- You can change settings according to your operating conditions.
- Keep on pressing "Esc" for 2 seconds or longer in the standby state to change settings.
- You cannot change settings in the Operation mode.

#### ■ 6-3-1. Setting data and ranges

##### Setting data

Setting items			Variable range	Step	Value set at factory shipment	Units
Warming-up time		Warming up	30 to 300	1	30	sec.
Oil alarming point 1	(alarm signal 1/AL1 lamp)	Oil Alarm 1	5 to 15	1	15	ppm
Oil alarming delay 1	(alarm signal 1/AL1 lamp)	Alarm 1 Delay	0 to 5	1	0	sec.
Oil alarming point 2	(alarm signal 2/AL2 lamp)	Oil Alarm 2	5 to 15	1	15	ppm
Oil alarming delay 2	(alarm signal 2/AL2 lamp)	Alarm 2 Delay	0 to 600	10	0	sec.
Alarm suppression (during warm-up, washing operation, and setting)		Alarm Suppress	Alarm output : OFF / Alarm suppression: ON	---	ON (Alarm suppression)	---
Washing timer (automatic washing time)		Auto Washing Time	30 to 600	1	60	sec.
Washing timer (manual washing time)		Man. Washing Time	10 to 600	1	50	sec.
RECut	During standby	Stand by Current	0 to 4	1	0	mA
	During washing	Washing Current	0 to 4 or 20 to 24	1	4	mA
	Exceeding the oil alarming point	Over Oil Alarm	Density or 20 to 24	1	Densit	mA
	Exceeding the oil concentration of 30 ppm (measuring limit)	Over range Current	20 to 24	1	20	mA
	During setting	Maint. Current	0 or 20 to 24	1	0	mA
	With equipment fault	Defect Current	0 or 20 to 24	1	0	mA

##### Setting method



- The above setting method in a black box is also applicable to the other setting items. (see the next page for the other setting items.)
- Press "Esc" to stop the setting operation halfway. The setting item screen is displayed back.



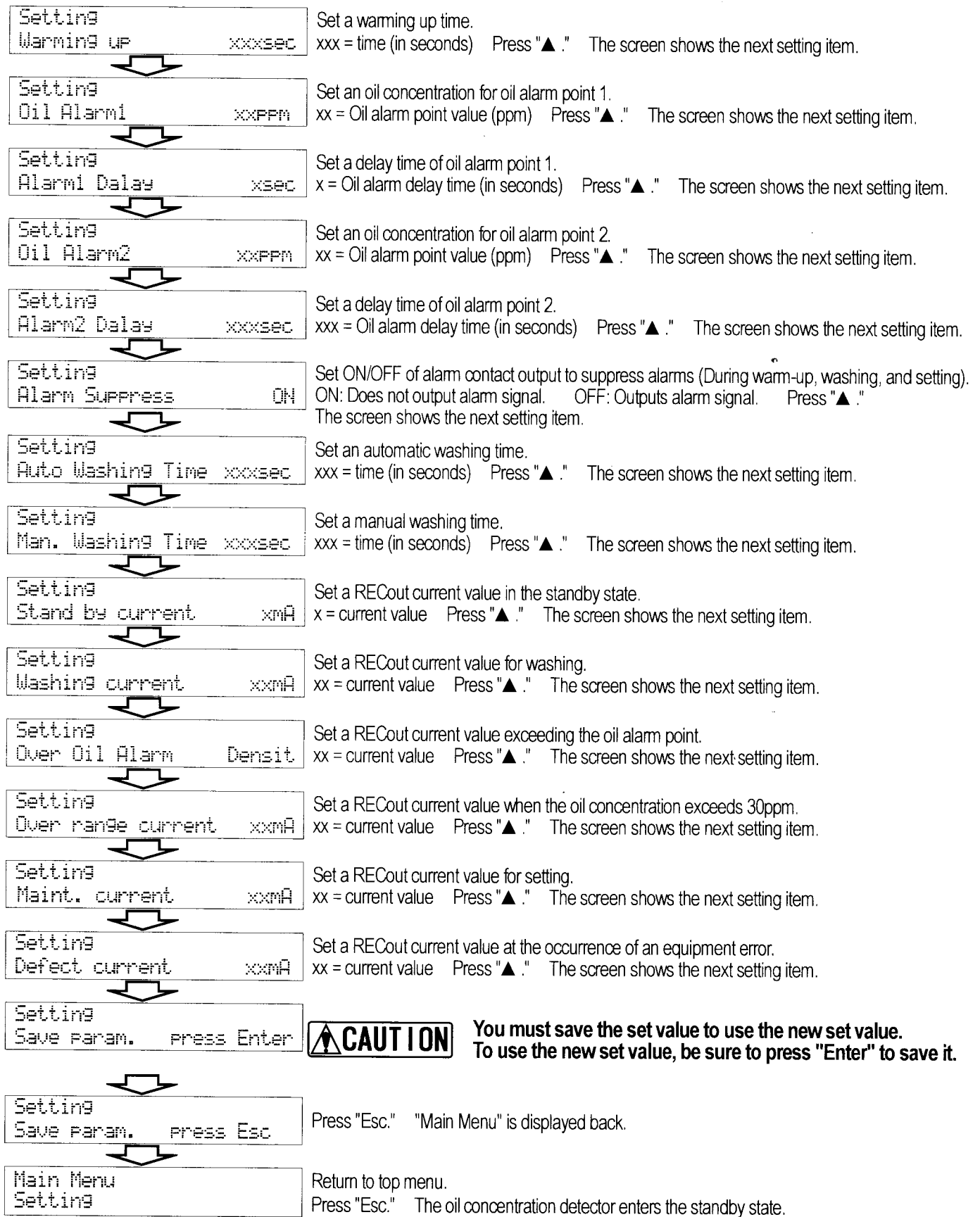
The new setting becomes valid after it is saved. Select the screen below and press "Enter" to save it.

Setting  
Save Param. Press Enter

...(see "Caution" on the next page.)

## 6. Setting

### ■ 6-3-2. Details of setting



With this, confirmation of item settings is completed.

#### Common items

- For value change examples, see "6-3-1 Setting data and ranges."
- Press "▼" to return to the preceding item.

## 7. Operation and Maintenance

- The FOCAS-2000 oil concentration detector is a high precision instrument.
- It is recommended for you to periodically check and maintain FOCAS-2000 as shown below to assure its performance for a long time.

### ■ Requirements

Item	Maintenance interval	Remarks
Sensor cleaning (with brush)	Every 2 weeks or every 10 measurements whichever comes first.	For cleaning method, see "8-4. Cleaning the sensor (brush washing)."
Zero-point check	Every month	For checking method, see "8-1-2. Zero-point check."
Filter cleaning	Every 3 months	For cleaning method, see "8-5. Cleaning the filter."
Desiccant (silica gel) check	Every month	Replace desiccant when the indicator change in color as below two types, ① Became pink (normally from blue to light purple) ② Became red dot on white base (normally black dot on white base) For desiccant (silica gel) replacement, see directions attached to desiccant (silica gel) which is an optional parts
Replacement of the clock backup battery	Every 2 years	For battery replacement, see "8-7 Replacing the clock backup battery."
Accuracy check	Every 2 years	Call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.
Performance check	Every 1 year or when the sensor unit is replaced	Call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.
Update of precision certificate	Every 5 years	Call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.

## 8. Maintenance and Checking

### ■ 8-1. Testing function

- The oil concentration detector has the following testing functions:  
Manual operation, Zero-point check from the upper lid, Zero-point check from the fresh water line, and RECut output test (See "6-1 Tabulated list of menu items.")
- To execute a testing function, keep on pressing "Esc" for 2 seconds or longer in the standby state. (The testing function is not enabled while the oil concentration detector is operation.)
- Select a testing function by pressing "▼" or "▲" in the "TEST Mode."

#### ■ 8-1-1. Manual operation (Manual running)

- Used to test-operation the disabled bilge separator or to use the sensor stain check function after manual washing.
- Confirm the standby state. ("Standby" and the current time are displayed on the screen of the oil concentration detector body.
- The manual operation is enabled independently of the ON / OFF state of the pressure switch, but it automatically ends five minutes later. After the manual operation ends, "Main Menu" is displayed back.
- Select "Manual running" by pressing "▼" or "▲" and press "Enter."  
The manual operation starts independently of the pressure of sample water.

Standby.  
20xx/xx/xx xx:xx:xx



Main Menu  
TEST Mode



TEST Mode  
Manual running



Press "Enter" to go to "manual running." (Continued to the next page.)

Confirm the oil concentration detector is in the standby state. ("Standby" and the current time are displayed on the screen of the oil concentration detector.)

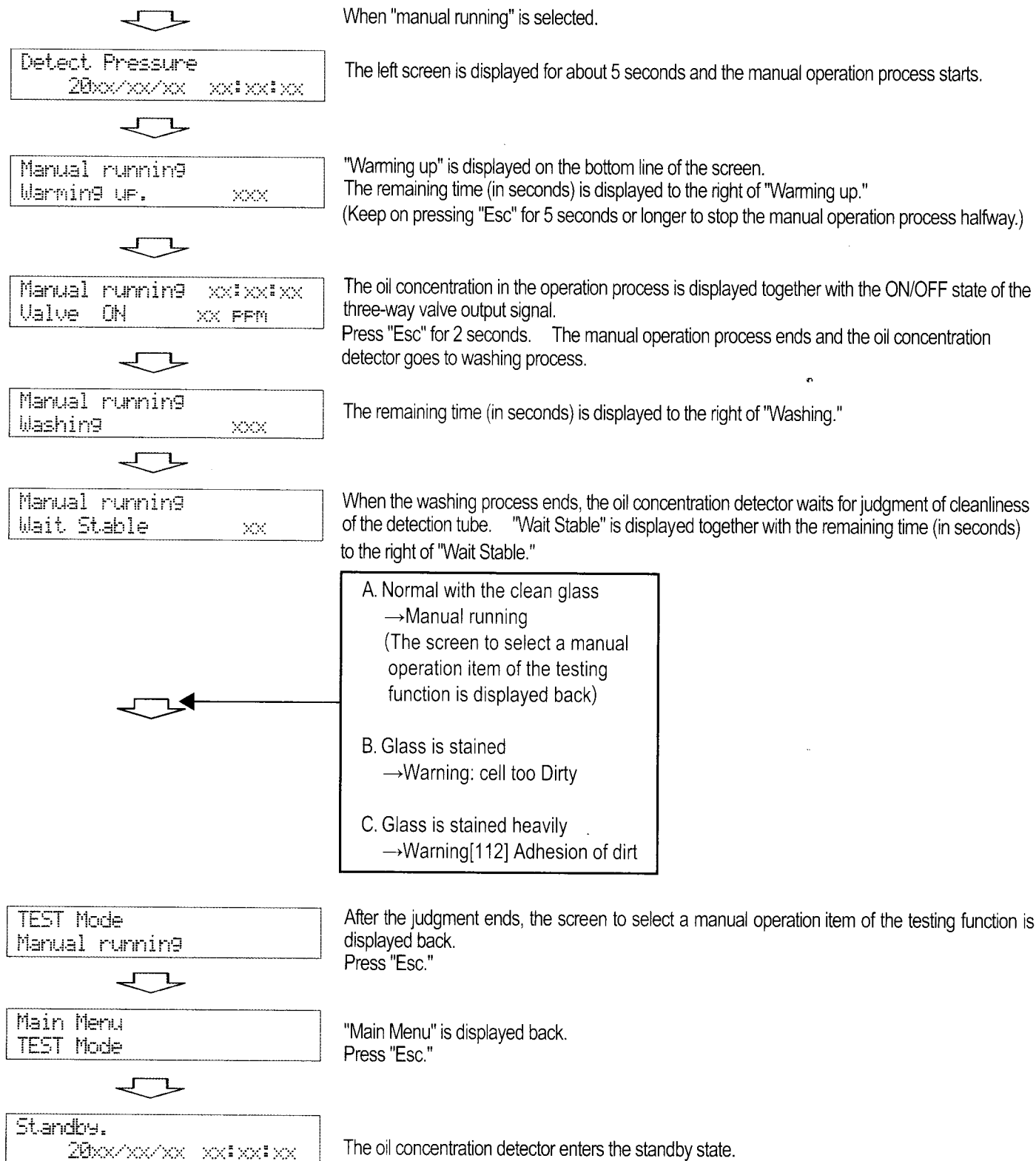
Close the valves at sample water line and at fresh water line. Open the upper lid of the sensor unit, and open the drain valve to empty the sensor inside. Close the drain valve and feed mineral water into the detection tube (to about 80% of the detection tube) from the top of the sensor unit (from which the upper lid is removed), and close the upper lid. Keep on pressing "Esc" for two seconds or longer in the standby state.

Press "▲" twice. "Test Mode" is displayed under "Main Menu."  
Press "Enter." A screen appears to select a testing function item.

"Manual running" is displayed to enable manual operation.  
Press "Enter."

## 8. Maintenance and Checking

■ Continued from the preceding page (8-1-1. Manual operation (Manual running))



Regarding details of warning please see P35 9.Troubleshooting

With this, the manual operation process is completed.

## 8. Maintenance and Checking

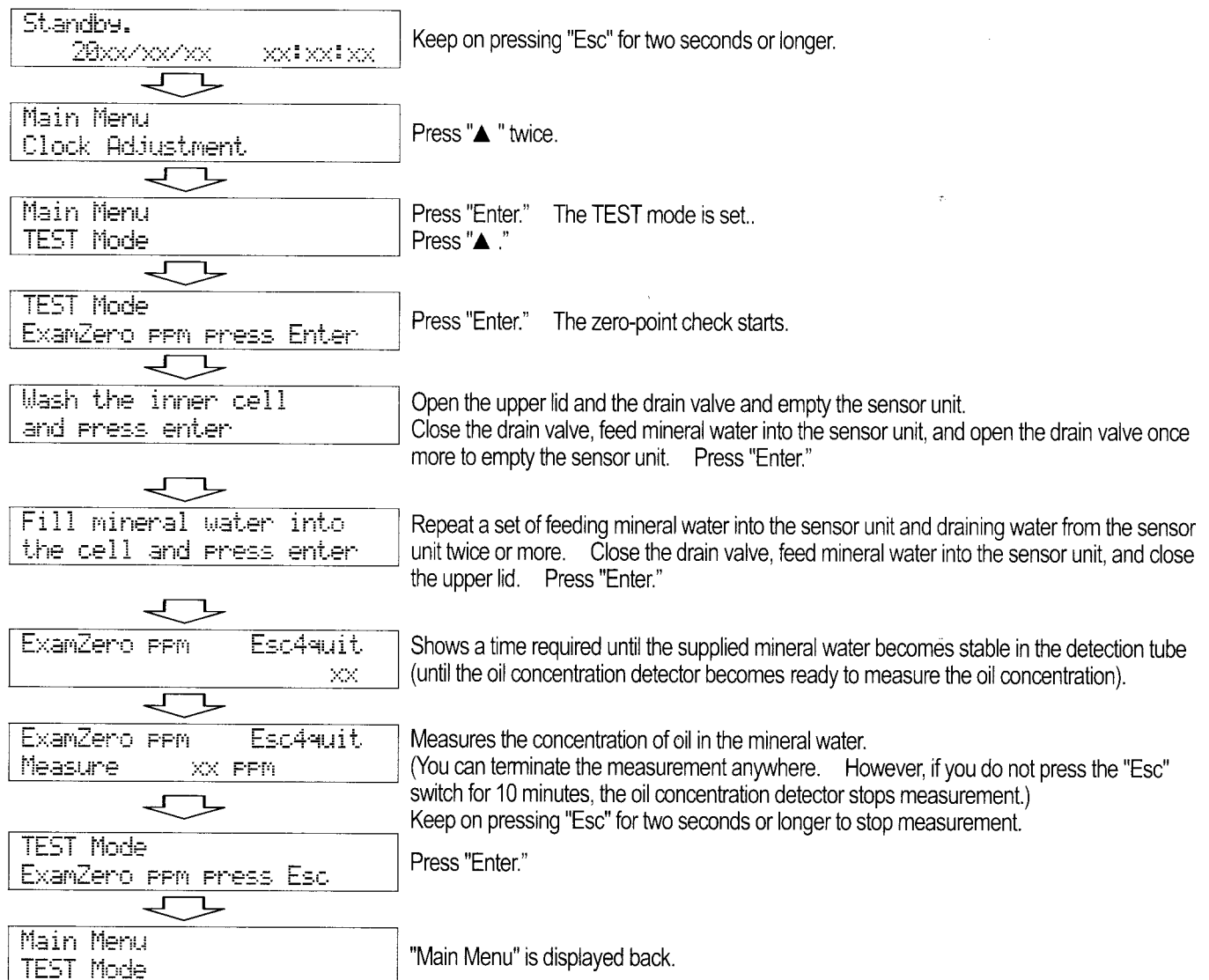
### ■ 8-1-2. Zero-point check (ExamZero ppm press Enter)



- Be sure to clean the sensor before starting the zero-point check.
- Always prepare mineral water.

- This may be caused by the dirty detection tube due to aging or contaminated water supplied from the fresh water inlet. This function is used to check such a stain of the detection tube.
- Please check once a month.

#### ■ Zero-point check by feeding mineral water from the upper lid portion (recommended)



With this, the zero-point check by feeding mineral water from the upper lid portion is completed.

## 8. Maintenance and Checking

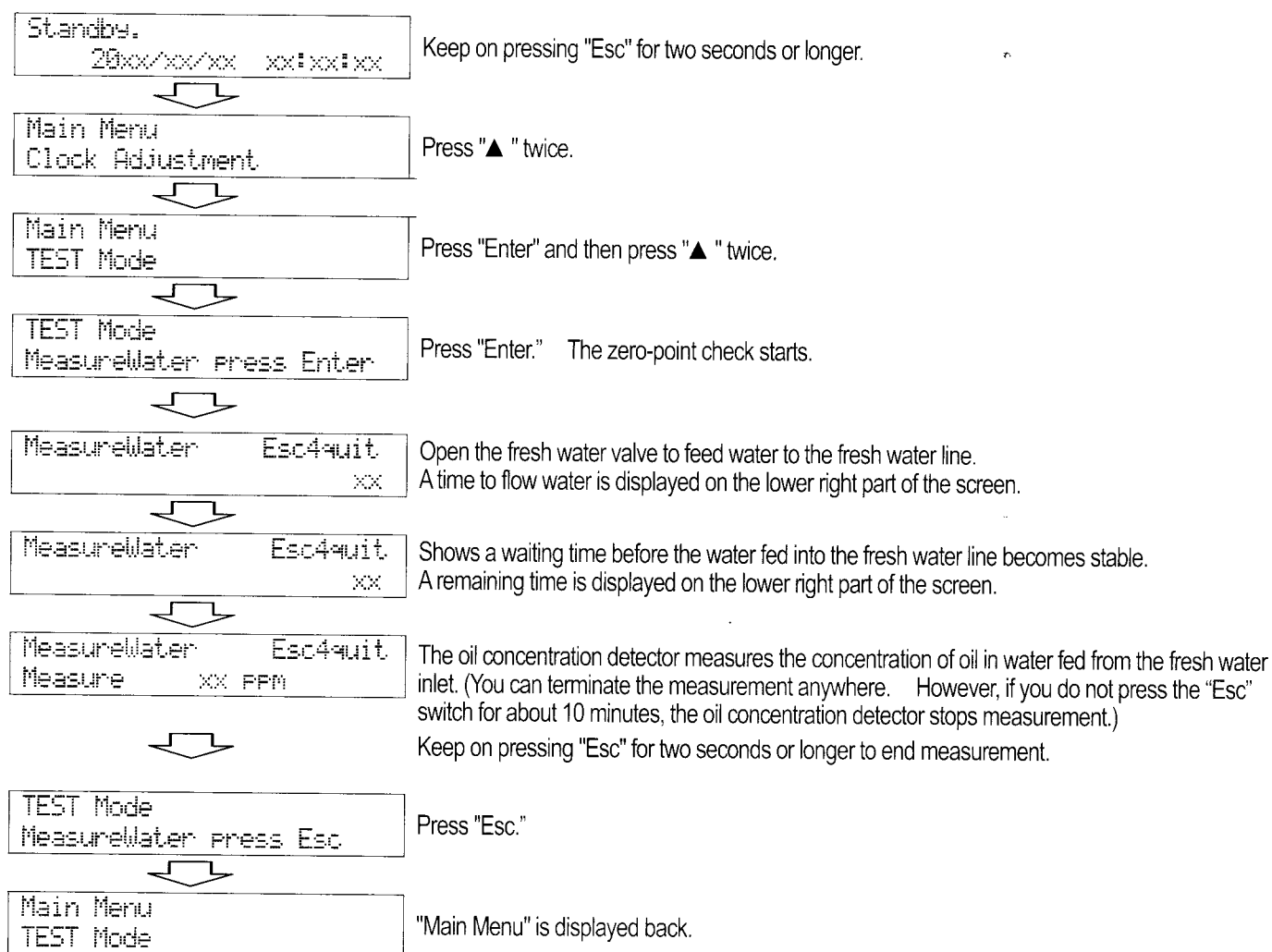
### ■ 8-1-3. Zero-point check (MeasureWater press Enter)



- This function simply checks the oil concentration of water supplied from the fresh water inlet.
- Execute manual washing to cleaning the sensor before starting this check function (Zero-point check by feeding water from the fresh water inlet).
- Do not feed industrial water or circulating reclaimed water to the fresh water inlet. When the fresh water is cloudy or contaminated, the oil concentration may not be measured correctly when the sensor is cleaned with the contaminated water.
- To check whether the measurement is influenced by the water supplied from the fresh water inlet, the zero-point check function (using mineral water) is used after sensor cleaning.

- If "Warning: cell too dirty" is displayed, this zero-point check function (by using water fed through the fresh water inlet) is used to check whether the fresh water is contaminated.

#### ■ Zero-point check procedure by feeding water through a fresh water line on a ship

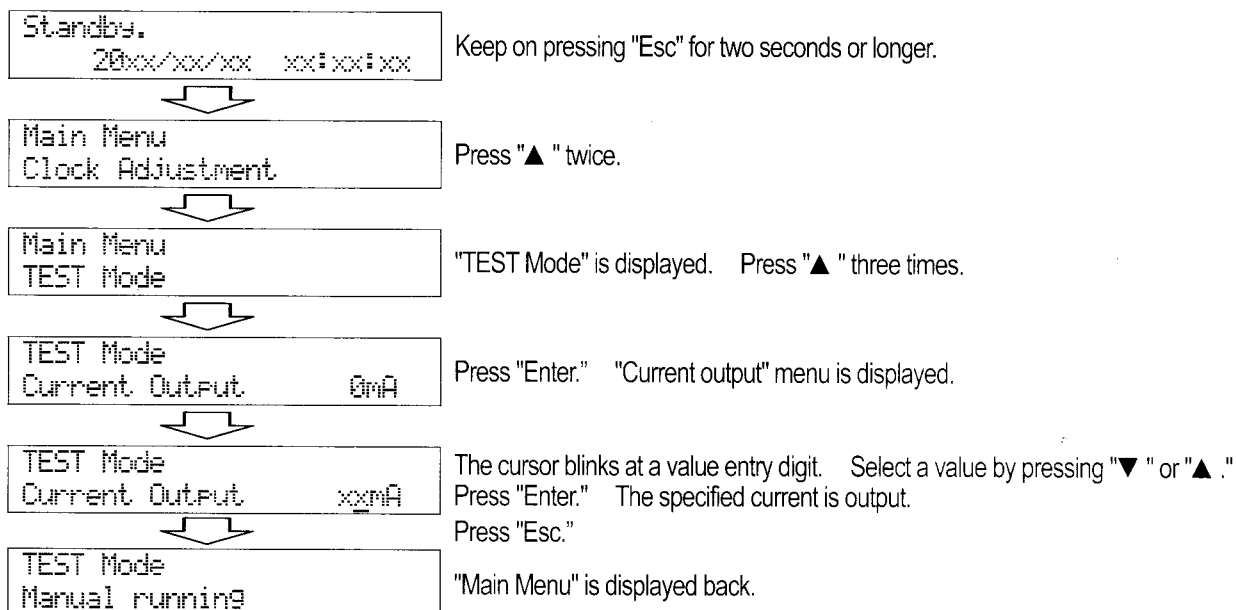


With this, the zero-point check by feeding water from the fresh water line on the ship is completed.

## 8. Maintenance and Checking

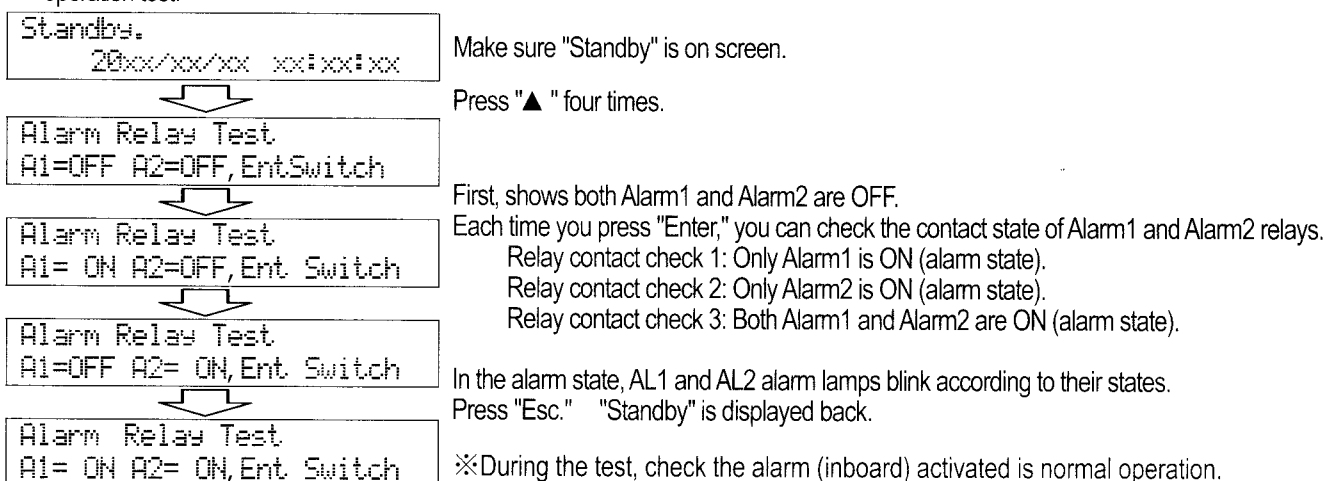
### ■ 8-1-4. RECut output test (Current Output xxmA)

- This test function is used to check the operation of a connected instrument and cable connections.
- This function can output a current of 0 to 24 mA at intervals of 1 mA.



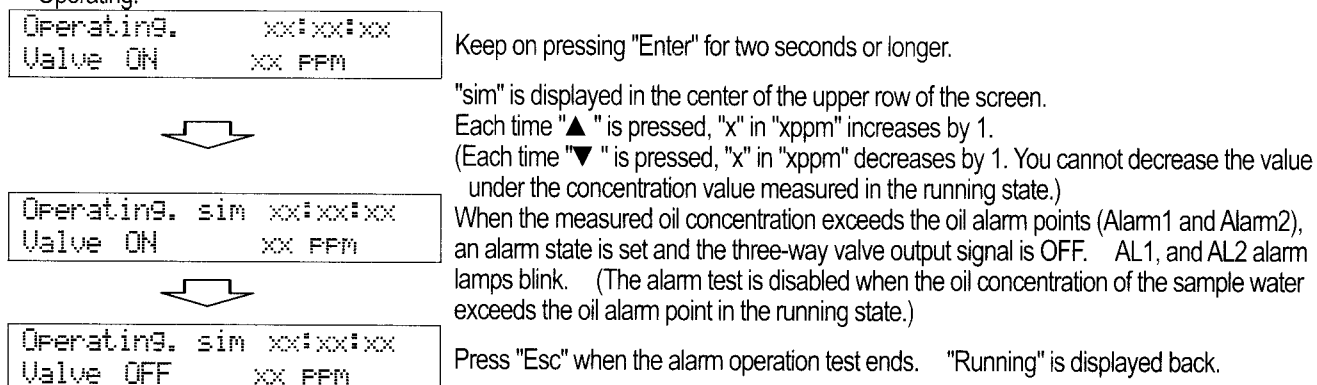
### ■ 8-1-5. Relay operation test

- This test function is used to test alarm relay operations (Alarm1 and Alarm2) in the standby state, but not available to a three-way valve operation test.



### ■ 8-1-6. Alarm operation test

- This function is used to test alarm operations (Alarm1, Alarm2, and three-way valve output signals) in the manual or automatic running state.
- In the Auto running state, "Operating" is displayed as shown below, but in the manual running state, "Manual" is displayed instead of "Operating."





## 8. Maintenance and Checking

■ 8-1-7. Operation state monitor

- This function monitors the operating state of the oil concentration detector (Standby, Auto running, Washing, and Error) and displays its information to avoid problems. (On Page 4, display items are different in "Standby" and "Running.")
- Record the operation state monitor data on screen. We may require it when repairing any oil concentration detector operation error or trouble that occurs (if requested by the customer).
- Select a screen you want by operating "▼" or "▲". When you press "Esc," "Standby" or "Running" is displayed back.

Display page	Display items	Description
Standby state	Standby. 20:xx/xx/xx xx:xx:xx	For display items for "Running," see "4-1 About items displayed on the screen - ●Automatic operation."
Page 1	Pressure = XXX      xxxx REC out = xx.x[mA]	Upper row left: Status of the pressure switch      XXX=OFF : No pressure applied Upper row right: Status of equipment      XXX=ON : Pressure applied Lower row: Output current value of RECout
Page 2	Sample water = XXX Clean water = XXX	Upper row: Status of the sample water valve; XXX = OFF: Closed; XXX = ON: Open Lower row: Status of the freshwater valve; XXX = OFF: Closed; XXX = ON: Open
Page 3	1=xxxx, 2=xxxx, 3=xxxx, 4=xxxx, Temp=xx.x	1, 2, 3 and 4 = Level values for each sensor; Temp = Sensor temperature ※each sensor level and temperature value are checked while FOCAS-2000 is measuring oil content in sample water or fresh water <Reference> If reset or power-off occurred after density measurement, following figures are displayed. They are not abnormal. 1=0000, 2=0000, 3=0000 4=0000, Temp=00.0
Alarm operation and test data in standby state		
Page 4	Alarm Relay Test A1=OFF A2=OFF,Ent Switch	Normally shows Alarm1 = OFF and Alarm2 = OFF. Press "▲ ." Page 5 is displayed.
Alarm operation and test data in the running state		
Page 4	Alarm Setting SET A1=xx / A2=xxPPM	A1 = Set value of the oil alarming point 1 for Alarm1 A2 = Set value of the oil alarming point 2 for Alarm2
Page 5	Control=AXXXXX Rev. X.XX Sensor =AXXXXX Rev. X.XX	Upper row: Serial No. of the controller and revision. Lower row: Serial No. of the sensor and revision.
Page 6	Calibration: xxxx/xx/xx Perform chk: xxxx/xx/xx	Upper row: Calibrating date or the date of precision checkup Lower row: Date of behavioral checkup
	Accuracy chk: xxxx/xx/xx Perform chk: xxxx/xx/xx	

※ In the Automatic operation state, the Alarm1 and Alarm2 operation tests are enabled when the oil concentrations are less than the oil alarm points.

※ Information on Pages 1, 3, 5, and 6 will be required by your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo when oil concentration detector errors and problems are repaired. Please let us know the information when requested.

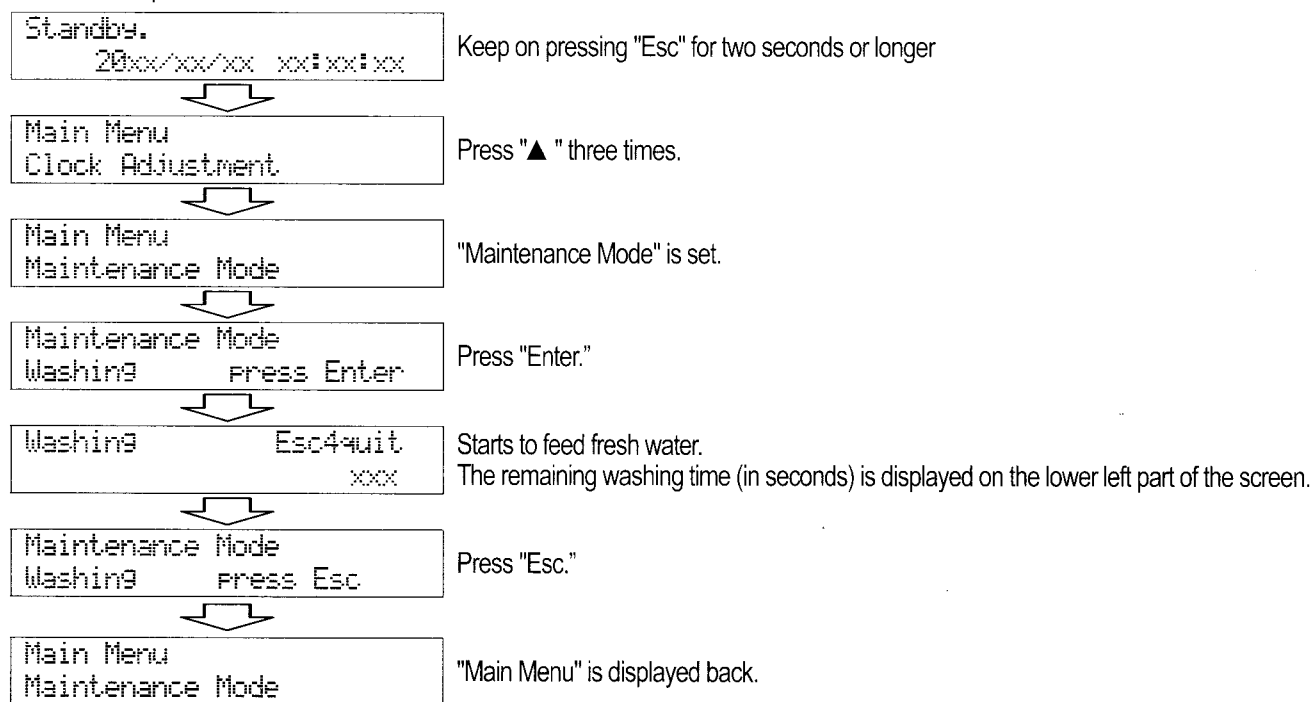
## 8. Maintenance and Checking

### ■ 8-2. Maintenance (Maintenance Mode)

- The oil concentration detector has Manual Washing, Zero-Point Compensation, Operation Check, and Reset After Zero-Point Compensation functions. (See "6. Setting (Outline)" - ■ Tabulated list of menu items.)
- To use a testing function, keep on pressing "Esc" for 2 seconds or longer in the standby state.  
(The testing function is not available while the oil concentration detector is running.)
- Select a maintenance function by operating "▼" or "▲" in the "Maintenance Mode."

#### ■ 8-2-1. Manual washing (Washing press Enter)

- The Manual Washing function performs a simple washing operation using water from the fresh water inlet before cleaning the sensor.
  - The Manual Washing function flows water from the fresh water inlet into the detection tube in the sensor unit for a preset time period.  
(But does not judge whether the detection tube is clean.)
  - Usually, you manually wash the inside of the detection tube and clean the sensor with brush while this function flows water (for a preset time period), drain the spent water from the detection tube, and use this function again to feed water (for a preset time period) to wash the sensor and the detection tube.
- Manual washing procedure
- Check and make sure the fresh water line is firmly connected to the fresh water inlet.
  - When started, the Manual Washing function opens the fresh water valve, flows water for a preset time period (set by "Manual washing time"), and then stops.



With this, the manual washing is completed.

#### ■ 8-2-2. Performance check (Performance press Enter)



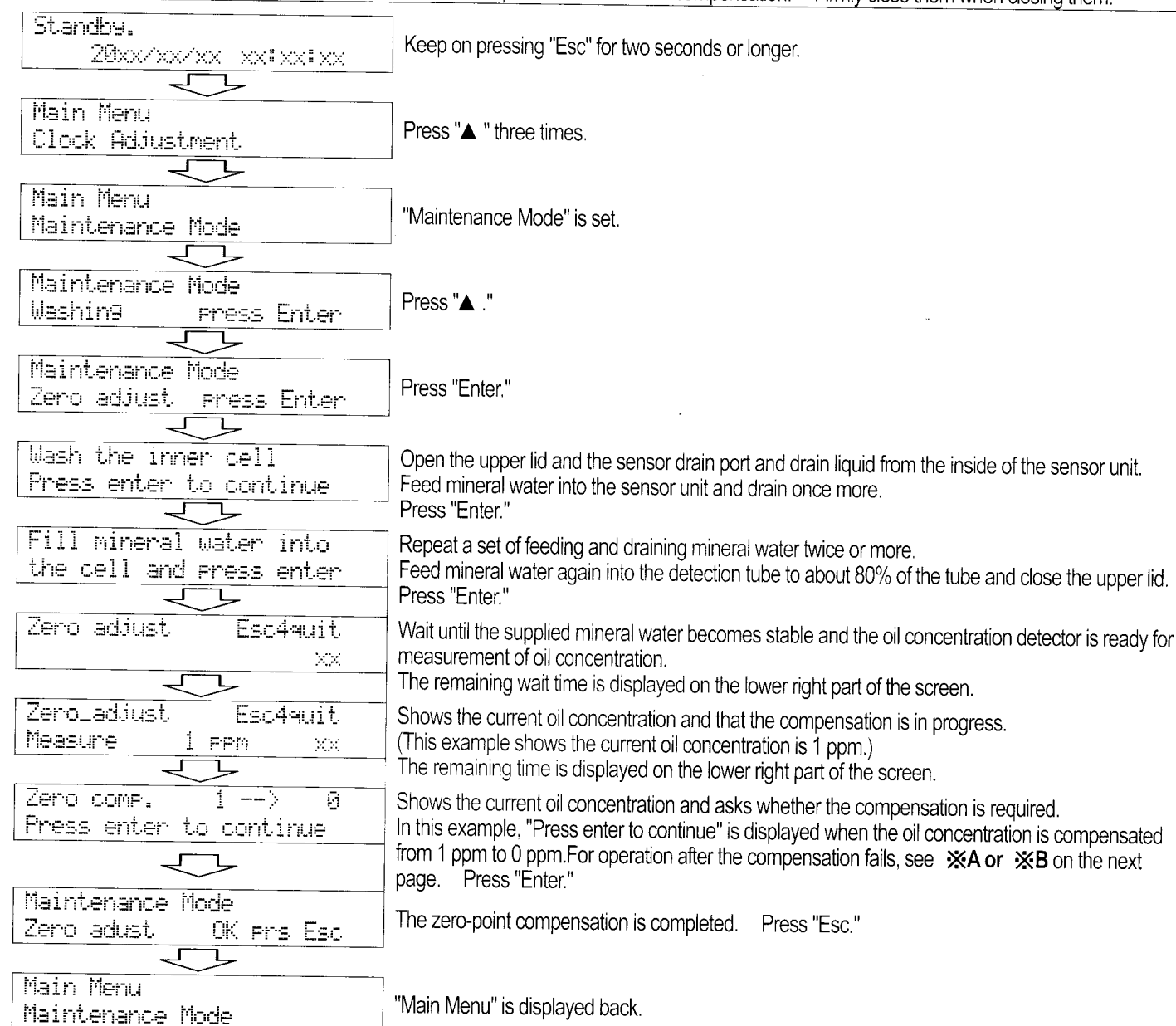
- This function is used to check whether a new sensor unit works normally (after replacement of the sensor unit).
- The Operation Test Kit (separately sold) is required to use this function.
- For details of the operating procedure, see the instructing sheet of the Operation Test Kit.

## 8. Maintenance and Checking

### ■ 8-2-3. Zero-point compensation (Zero Adjust press Enter)

- When a high oil concentration value is displayed after a Zero-point check using mineral water, this function is displayed oil concentration value (less than 5 ppm) to 0 ppm.

- Do not implement the Zero-Point Compensation function just after "Stain warning" or "Error" is displayed. The oil concentration detector may not work normally.
- The Zero-Point Compensation function is not used when a warning, error, or trouble state occurs. Moreover, the function is not used frequently.
- The Zero-Point Compensation function is enabled only when the oil concentration is less than 5 ppm. If the function is implemented while the oil concentration is 5 ppm or higher or any other water than the mineral water is used, warning and error states may occur frequently and the oil concentration detector cannot work normally.
- This oil concentration detector is a ultra-high sensitivity measuring instrument capable of detecting the oil concentration of 15 ppm. Therefore, mineral water should be used as reference water for zero-point compensation. (One 500-mL bottle of mineral water is sufficient for the compensation.)
- This function has no effect to clean the inside of the detection tube. This function compensates the influence by the contamination of the inside of the detection tube. (Reference: Contamination Check function measures the quantity of physical contaminants in the detection tube.)
- Be sure to execute manual washing (see "8-2-1 Manual washing") and sensor cleaning with brush (see "8-4 Cleaning the sensor (brush washing)") before starting the zero-point compensation.
- The upper lid and drain valves are opened and closed for compensation. Firmly close them when closing them.



With this, the zero-point compensation is completed.

## 8. Maintenance and Checking

### ■ 8-2-3. Zero-point compensation (Zero Adjust press Enter)

※A

The zero-point compensation is disabled when oil concentration over 5 ppm is detected in the zero-point compensation after sensor cleaning because of oil or residue of contaminant in the detection tube.

```
Zero comp.    5 -->  5
Fail zero compensation
```

This example shows a case that an oil concentration over 5 ppm is detected. Shows an oil concentration outside the compensation range.

This example shows compensation of oil concentration from 5 ppm to 0 ppm. Press "Enter."

```
Washing      Esc4quit
              xxx
```

Opens the fresh water valve to flush fresh water into the detection tube to keep the performance of the tube. The remaining flushing time is displayed on the lower right part of the screen.

```
Maintenance Mode
Press enter to continue
```

Press "Enter."

```
Maintenance Mode
Zero adjust  NG one more
```

On the next screen, you can select one of two methods.

Press "Esc" to go back to "Main Menu" or press "Enter" to retry the zero-point compensation. (It is recommended to turn off the oil concentration detector and clean the sensor before retrying the zero-point compensation function.)

With this, the explanation is completed about the failure of the zero-point compensation when an oil concentration over 5 ppm is detected. ※ In this case, the zero-point compensation is not implemented.

※B

The zero-point compensation is disabled when the detection tube is judged to be dirty (because oil or contaminant on the inside wall of the detection tube cannot be flushed away by sensor cleaning) or when oil concentration over 5 ppm is detected in the zero-point compensation.

```
Zero comp.    10 --> 10
Warning: cell too Dirty
```

Displayed when the inside of the detection tube is dirty.

(In this display example, 10 ppm → 10 ppm)

To warn that the detection tube is dirty. Press "Enter."

```
Washing      Esc4quit
              xxx
```

Opens the fresh water valve to flush fresh water into the detection tube to keep the performance of the tube. The remaining flushing time is displayed on the lower right part of the screen.

```
Maintenance Mode
Press enter to continue
```

Press "Enter."

```
Maintenance Mode
Zero adjust  NG one more
```

On the next screen, you can select one of two methods. Press "Esc" to go back to "Main Menu" or press "Enter" to retry the zero-point compensation. (It is recommended to turn off the oil concentration detector and clean the sensor before retrying the zero-point compensation function.)

With this, the explanation is completed about the failure of the zero-point compensation when an oil concentration over 5 ppm is detected. ※ In this case, the zero-point compensation is not implemented.

### ■ 8-2-4. Function for recovery after zero-point compensation (Recover press Enter)

- This function is used to reset the compensated value (compensated by "8-2-2 Zero-point compensation") to the initial value (not compensated).

```
Standby.
20xx/xx/xx xx:xx:xx
```

Keep on pressing "Esc" for two seconds or longer

```
Main Menu
Clock Adjustment
```

Press "▲" three times.

```
Main Menu
Maintenance Mode
```

"Maintenance Mode" is set. Press "Enter."

```
Maintenance Mode
Washing      press Enter
```

Press "▲" four times.

```
Maintenance Mode
Recover      press Enter
```

Press "Enter."

Resets the zero-point-compensated value to the previous value (before compensation).

```
Maintenance Mode
Recover      press Esc
```

Press "Esc."

```
Main Menu
Maintenance Mode
```

"Main Menu" is displayed back.

With this, resetting to the uncompensated value is completed.

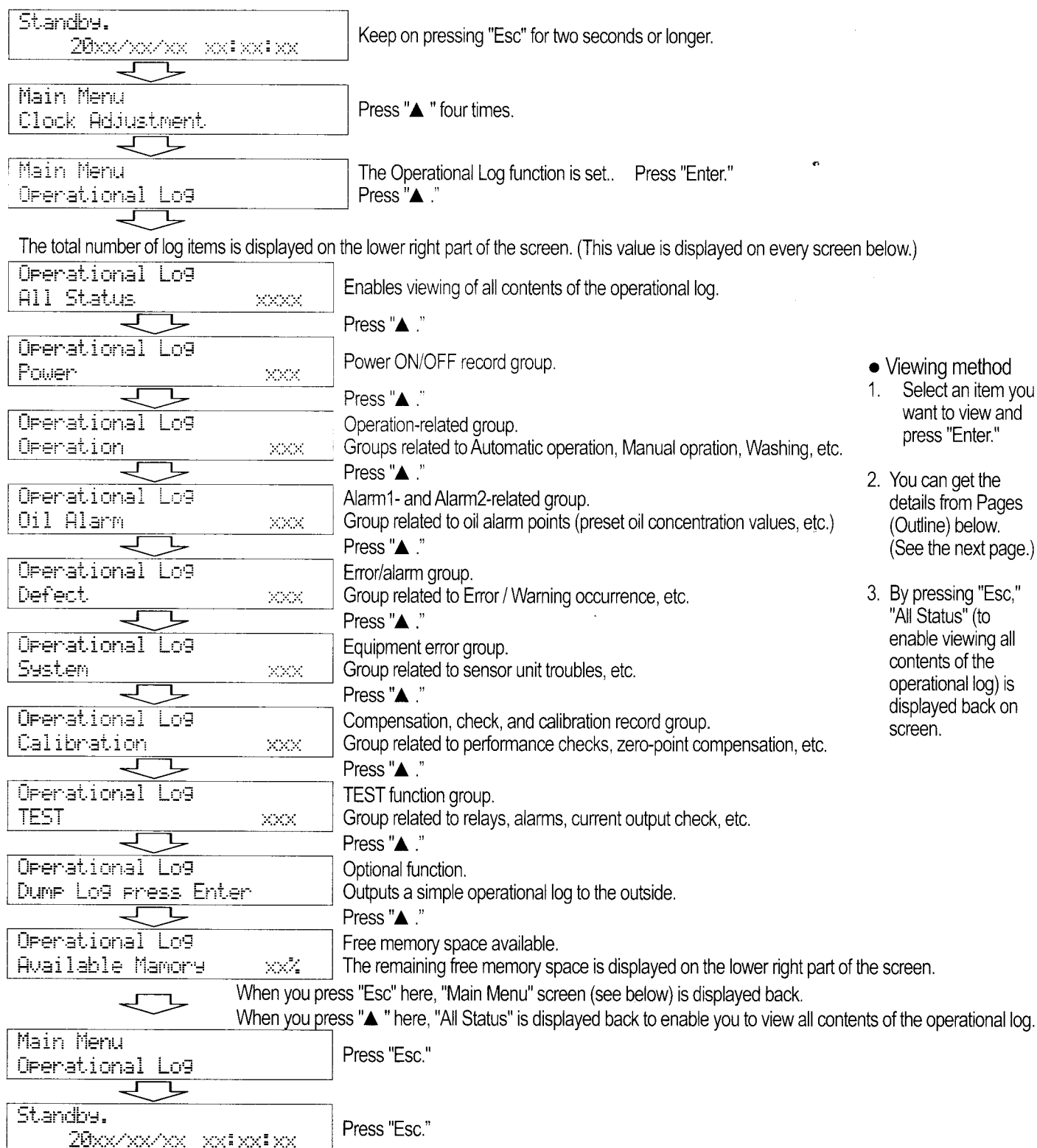
## 8. Maintenance and Checking

### ■ 8-3. Viewing the operational log

- This function is used to read the operational log (that has recorded bilge alarm operations, warning and error operations) on the screen.
- This function can display the contents of the operation log wholly or in groups and roughly or in detail.
- You can view the content of the operation log only while standby. (You cannot view while operate.)
- "Dump Log" as a viewing item is an optional function. (For more information, call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.)
- This function can also view the content of operational log memory card of FOCAS-1800 (with some limitations). (see ※1 of "section 6-1")

#### ■ 8-3-1. Data groups of operational log

- To facilitate viewing of the content of the operational log, the recorded data can be classified into some functional groups. The groups are explained below.



- Viewing method
- 1. Select an item you want to view and press "Enter."
- 2. You can get the details from Pages (Outline) below. (See the next page.)
- 3. By pressing "Esc," "All Status" (to enable viewing all contents of the operational log) is displayed back on screen.

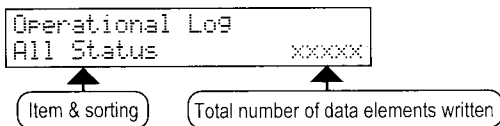
With this, the explanation of each functional group item of the content of the operational log is completed. Outlined and detailed displays of each group are explained below.

# 8. Maintenance and Checking

## 8-3-2. Outlined and detailed displays of the operational log

- Here we'll explain how to view details of the operational log from the outlined display and also explain their screens.
- ※The oil alarm point (Alarm Setting) record will be explained on the next page "8-3-3 Oil alarm point (Alarm Setting) record display screen" since their screens are different. Regarding details of the log please see "12.Display of groups and description of statuses".

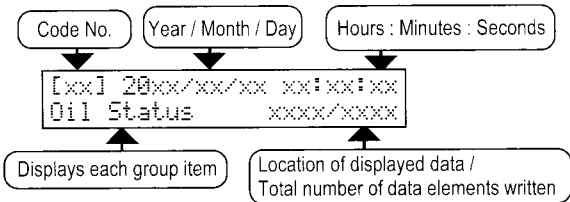
### Outlined display



This example shows how to view an Alarm1 ON operational log group in the All Status mode.  
The left screen is displayed after "Enter" is pressed.

Press "Enter." The selected group item of "All Status" is displayed.

### Display of a group item

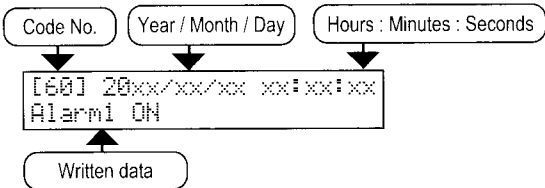


The left display example is displayed when the "All Status" group item is selected.

Press "Enter." Page 1 of details is displayed.

### Detailed display

#### Page 1



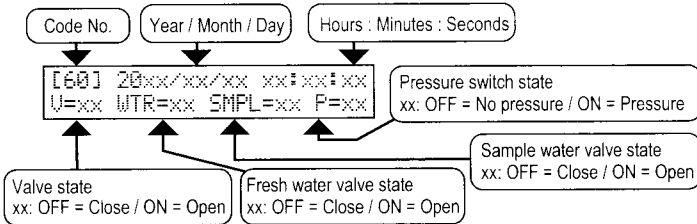
You can check the details of the operational log group item.  
The left display example is displayed when "Alarm1 ON" is selected.

You can also view old records by pressing "▼" on this screen.

Press "Enter." Page 2 of details is displayed.

### Detailed display

#### Page 2



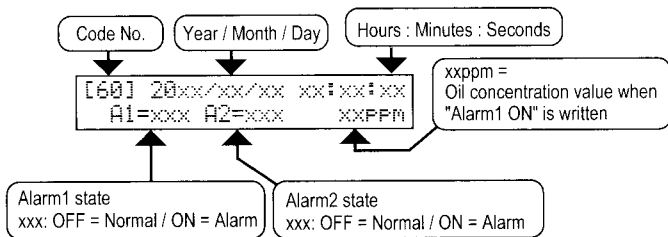
On the left screen, you can confirm the states of the three-way valve, fresh water valve, sample water valve, and pressure switch when "Alarm1 ON" is written.

You can also view old records by pressing "▼" on this screen.

Press "Enter." Page 3 of details is displayed.

### Detailed display

#### Page 3



On the left screen, you can confirm the alarm operation state and the oil concentration value when "Alarm1 ON" is written.

You can also view old records by pressing "▼" on this screen.

Press "Enter." "All Status" group item is displayed back.

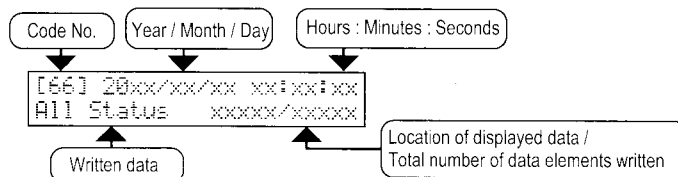
Press "Esc" to end viewing.

## 8. Maintenance and Checking

### ■ 8-3-3. Oil alarm point (Alarm Setting) record display screen

- Here we'll explain display screens on which you can check oil alarm point set values.

Display of a group item



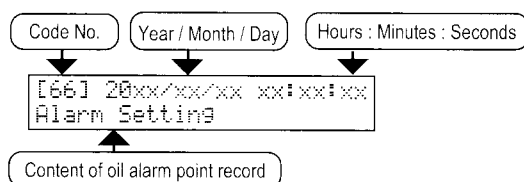
This display example explains how to view the Alarm1 Setting operational log from the "All Status" group item. The left screen is displayed when "All Status" group item is selected.

You can also view old records by pressing "▼" on this screen.

Press "Enter." Page 1 of details is displayed.

Detailed display of  
Alarm Setting

Page 1



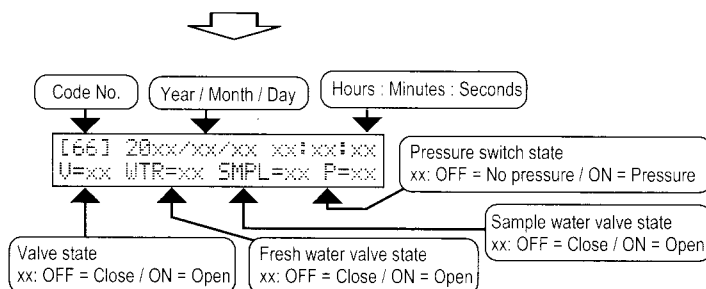
This screen is displayed when the Alarm Setting item is found on the All Status group item screen. (The "Alarm Setting" screen has a code [66] on the upper right part of the screen.)

You can also view old records by pressing "▼" on this screen.

Press "Enter." Page 2 of Alarm Setting (Details) is displayed.

Detailed display of  
Alarm Setting

Page 2



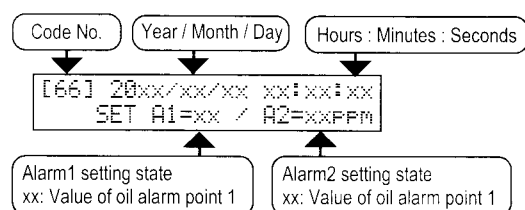
On the left screen, you can confirm the states of the three-way valve, fresh water valve, sample water valve, and pressure switch when "Alarm Setting" is written.

You can also view old records by pressing "▼" on this screen.

Press "Enter." Page 3 of Alarm Setting (Details) is displayed.

Detailed display of  
Alarm Setting

Page 3



On the left screen, you can confirm Alarm1 and Alarm2 oil alarm point set values.

You can also view old records by pressing "▼" on this screen.

Press "Enter." "All Status" group item is displayed back.  
Press "Esc" to end viewing.

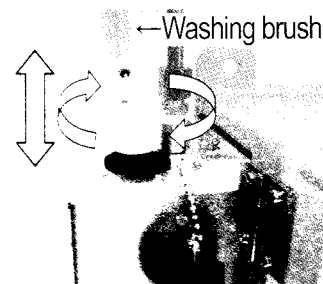
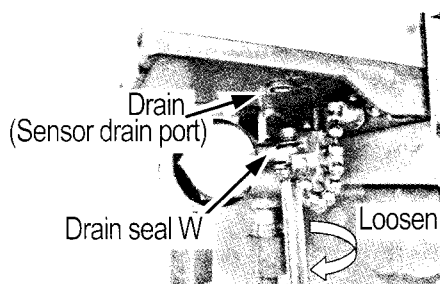
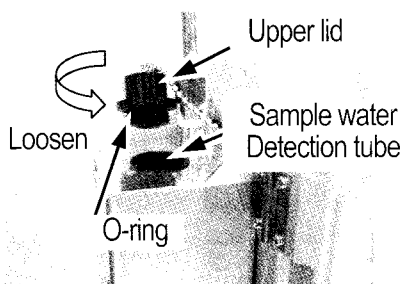
## 8. Maintenance and Checking

### ■ 8-4. Cleaning the sensor (brush washing)

- It is recommended to periodically clean the inside of the detection tube in the sensor unit to enjoy its performance for a long time.
- Clean the detection tube once per 2 weeks or per 10 measurements whichever comes first.

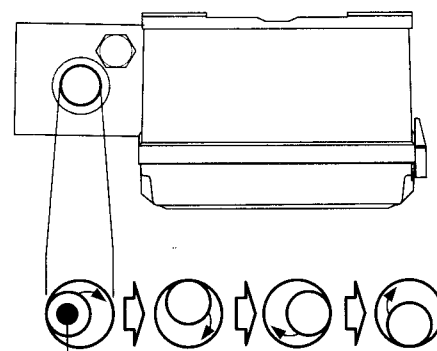


- Be sure to turn off power to the oil concentration detector (FOCAS-2000) before starting sensor cleaning.
- Carefully clean the sensor unit and the inside of the detection tube.
- Use a dedicated cleaning liquid. \* Never use any organic or alcoholic solvent.
- Immerse the dedicated washing brush in water until it fully becomes soft before using it.
- After the cleaning process is completed, wash the dedicated washing brush with water containing neutral detergent, rise the brush fully with fresh water (to remove the detergent), and store it in a clean place (with the brush body fully immersed in mineral water or dedicated washing liquid).
- Check and make sure the O ring is fitted to the upper lid when closing the upper lid. Without the O ring, a water may leak from the upper lid.
- When finding a water leak from the upper lid while the oil concentration detector is running, immediately stop the oil concentration detector and firmly tighten the upper lid.



#### ■ Cleaning procedure

1. Prepare the dedicated washing liquid and washing brush.
2. Be sure to immerse the washing brush in water to soften it and remove excessive water from the brush.
3. Turn off power to the oil concentration detector, close the sample water valve and the fresh water inlet valve, and remove the upper lid.  
(Use an adjustable wrench or the like to open the upper lid if it is too hard to open.)
4. Open the drain port (in the sensor unit), drain the sample water detection tube, and close the drain port.
5. Feed the washing liquid to 80% of the detection tube.
6. Wash the inside of the detection tube by moving the washing brush up and down and turning the brush. Wash the inside wall of the detection tube by turning the brush along the wall surface as shown right.
7. Open the drain port, drain water from the detection tube, and close the drain port.  
Feed mineral water to 80% of the detection tube, open the drain port, drain water from the sample water detection tube, check and make sure the drain seal washer is fitted to the drain, and close the drain port.
8. Turn on power to the oil concentration detector, manually operation the oil concentration detector by using mineral water according to the manual running procedure (see "■ 8-1-1 Manual running"), and make sure "Warning: cell too dirty" is not displayed. When the warning is displayed, repeat manual washing, sensor cleaning, and manual running (see 8-1-1), and check whether the detection tube is clean.
9. Open the upper lid, check the state of the upper part of the detection tube and the O ring of the upper lid. Wipe off stain or dust (if any) on the O ring with clean waste cloth. Firmly fasten the upper lid by your hands. (Firmly fasten it by your hands. You need not use an adjustable wrench or the like.)
10. Open the sample water valve and the fresh water inlet valve (to the original positions).
11. Feed fresh water according to "■ 8-2-1 Manual washing (Washing press Enter)" and end the manual washing.



Washing brush

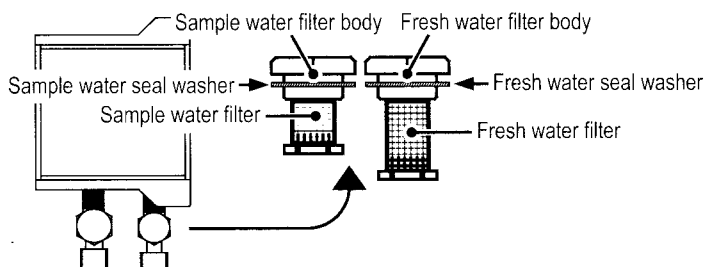
- Wash the inside of the detection tube by moving the washing brush up and down and turning the brush.

### ■ 8-5. Cleaning the filter

Clean the filter when "Warning: cell too dirty" is frequently displayed when the oil concentration detector is running or at the end of running. The filter should be cleaned about every 3 months.



- When the water supplied from the sample water inlet contains high concentration of oil or contaminants or when industrial water or circulating reclaimed water is supplied from the fresh water inlet, the filter may be clogged with oil film, contaminant, and/or dust and will lose its performance. If the filter is clogged too much, oil concentration detector operation will be disabled.



#### ■ Filter cleaning procedure

1. Close the sample water inlet valve and the fresh water inlet valve respectively to the OFF position to stop water supply.
2. Rotate and remove the filters by using an adjustable wrench.
3. Clean each filter with a soft plastic brush and neutral detergent solution.
4. Rinse each filter fully with water.
5. Remount the filters.

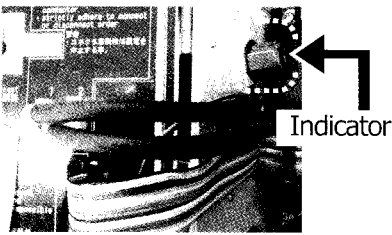


## 8. Maintenance and Checking

### ■ 8-6. Checkup and replacement timing of desiccant (silica gel)



- Be sure to close the case cover and lock the snap latch before operation the oil concentration detector.



Inspect the color of desiccant (silica gel) in the indicator every month. When desiccant (silica gel) is change in color, replace it by new one. There are two type depends on the delivered date.

1	Normal	blue to light purple	change in color	Pink
2	Normal	Black dot on white base	Change in color	Red dot on white base

#### ■ Check and replacement procedure

1. Desiccant (silica gel) is provided on the body unit for preventing dew condensation in the sensor unit.
2. The desiccant can be checked by unlocking the snap latch on the body unit
3. For desiccant (silica gel) replacement, see directions attached to desiccant (silica gel) which is an optional parts.

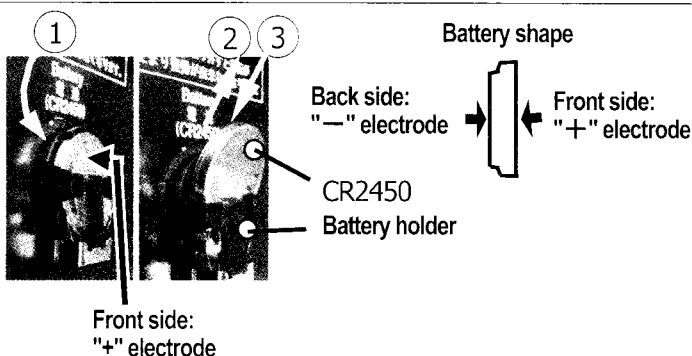
### ■ 8-7. Replacing the clock backup battery

- The service life of the battery is about 2 years from the date on which its insulating sheet is removed for use of the battery. Be sure to replace the battery by new one within two years and write the date of replacement on its label.
  - Be sure to turn off power to the oil concentration detector before starting to replace the battery. The service life of the battery is dependent upon the operating state of the oil concentration detector. (If power is not supplied to the oil concentration detector for a long time, the service life of the battery may be shorter.) Be sure to replace the battery before it is exhausted completely.
  - If the battery (defective battery) is left exhausted in the oil concentration detector, the clock may be reset when power to the oil concentration detector is shut down and "Warning [17C]" is displayed on the screen.
 

Warning [17C]  
RTC Lost voltage
- At the same time, Alarm1 and Alarm2 are output and the oil concentration detector will be disabled.
- The clock backup battery is a lithium manganese dioxide coin cell battery "CR2450."
  - When the battery is removed, the clock is reset. Be sure to set the clock right after replacing the battery.
  - Press the battery until it is firmly seated and locked in the holder.
  - The battery is covered with metal. Be careful not to let the battery touch electronic parts around the battery.
  - Be sure to take out the battery from inside the oil concentration detector when you drop it.



- Turn off power supply and make sure all lamps are off.
- Do not reverse the polarities of the battery.
- Do not use any metallic screw driver to demount the battery. If done, the battery may be damaged.



#### ■ Replacement of the clock backup battery

- Prepare a lithium manganese dioxide coin cell battery (Model "CR2450").

#### ■ Demounting the battery

Lift up the battery in the direction of ① from the clearance of the battery holder and pull it in the direction of ② direction to detach.

#### ■ Remounting the battery

Insert the battery into the battery holder from the direction of ③ until it is firmly seated and locked. Do not reverse the polarities.

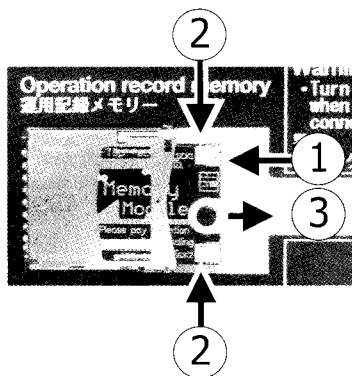
## 8. Maintenance and Checking

### ■ 8-8. Replacing the operational log memory card

Replace the operational log memory card when the remaining free space of the operational log memory card becomes insufficient or when viewing the content of the other (old) operational log memory card.



- Turn off power to the oil concentration detector and make sure all lamps are off.
- Do not try to replace the operational log memory card while power is supplied to the oil concentration detector. If done, the memory card may lose its content or destroyed.
- Do not touch the terminal contacts of the operational log memory card.
- The operational log memory card is very sensitive to static electricity and will be easily destroyed by it. First remove static electricity from the oil concentration detector and your body.



#### ■ Preparation

Prepare an operational log memory you want to use.

#### ■ Removing the operational log memory card

Push the operational log memory card in the direction ①.  
The operational log memory card is unlocked and pops up a little.  
Hold the operational log memory card at ② and pull it out slowly in the direction ③.

#### ■ Mounting the operational log memory card

Hold the operational log memory card with its notched portion faced to the rear and the gold-plated contacts faced down and push in the operational log memory card in the direction ①.  
Push it until it hits the end, pushed back a little, and locked.  
(Do not push in the card too strong. The card may not be locked.)

**《CAUTION》 Please note one memory card should be used for only one FOCAS-2000 unit.**  
If the memory card which was used in a certain FOCAS-2000 is inserted in another FOCAS-2000 unit, 「Warning [11E] Memory ID different」 is displayed.  
If 「Enter button」 is pressed in this condition, the unit becomes Standby condition. However density measurement cannot be performed.  
All you can do is to confirm log.

For use, please check the instruction manual (replacing the operation recording memory of FOCAS-2000) which is attached when you bought the memory card.

Notice: The vessels which navigate to US territorial waters, it should be retained record for at least 3 years it may be needed.(accordance with 2.2.2.1 of 2013VGP)

#### • Management and storage of the operational log memory card.

In some cases, the operational log memory card is required for inspection according to rules.

Put the replaced operational log memory card (replaced a maximum of 18 months ago) in a specified static-free storage bag.  
write its date of replacement, and carefully store it for 18 months.

At the time of an on-the-spot inspection, the inspector may require the operational log memory card for viewing.

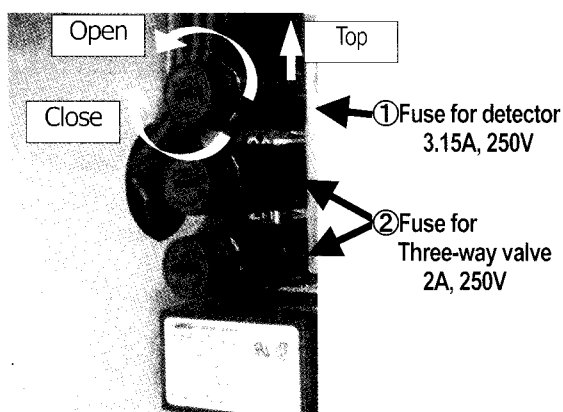
### ■ 8-9. Replacing the fuses

The fuses may be blown out when the oil concentration detector screen shows nothing or the three-way valve connected to the oil concentration detector is inactive although power is supplied to the oil concentration detector. Check whether the fuse is blown out.

- The fuses works to protect the oil concentration detector and external units (three-way valve output signals) against overcurrent.
- The oil concentration detector uses two types of fuses: fuse for the oil concentration detector and fuse for external unit.  
Their ratings are different. Do not mix them up.
- Use the specified fuses only.
- When one of the fuses is blown out, the oil concentration detector or three-way valve output signal may be abnormal.
- Do not use a flat-head screwdriver to turn the fuse holder cap.



- Turn off power to the oil concentration detector and make sure all lamps of the oil concentration detector are off.
- Replace the fuses by new ones. If the fuses are still blown out, the connections of the terminal base of the oil concentration detector or the three-way valve may be defective. Inspect the insulation of the three-way valve (for insulation defect due to aging) and terminal connections of the oil concentration detector.



#### ■ Preparation

Prepare replacement fuses.

Fuse for oil concentration detector:  $\phi 5$  - 20 mm, ceramic tube type 3.15A, 250V (1 pc.)

Fuse for three-way valve  $\phi 5$  - 20 mm, glass tube type 2A, 250V (2 pcs.)

#### ■ Demounting

1. Turn the fuse holder counterclockwise while pressing it with your finger.
2. Take up the fuse holder.
3. Pull out the fuse from the cap of the fuse holder.

#### ■ Remounting

1. Insert the fuse into the cap of the fuse holder.
2. Turn the fuse holder clockwise with the fuse on the cap.
3. Check and make sure the fuse holder cap is tight.

## 9. Troubleshooting

### ■ Principal measures against failure

Symptom	Possible cause	Action / measures
No power supply	<ul style="list-style-type: none"> <li>The oil concentration detector fuse was blown out by an overvoltage on the oil concentration detector.</li> </ul>	<ul style="list-style-type: none"> <li>Check the supply voltage (90 to 240 V). Turn off power to the oil concentration detector and replace the fuse by a new one.</li> </ul>
Inactive three-way valve	<ul style="list-style-type: none"> <li>The three-way valve fuse was blown out by an overload on the three-way valve terminals.</li> </ul>	<ul style="list-style-type: none"> <li>Check the cable between the oil concentration detector and the three-way valve for short-circuit or damage. Check the three-way valve for troubles. Replace the fuse by a new one.</li> </ul>
Asynchronous three-way valve and Alarm1 operations	<ul style="list-style-type: none"> <li>An Alarm1 delay time has been set.</li> </ul>	<ul style="list-style-type: none"> <li>Check the setting data and ranges (see 6-2-1) and set the Oil Alarm Delay 1 to "0 sec" (see "6-2-2. Setting method").</li> <li>※ The Alarm1 output should work in synchronism with the AL1 lamp.</li> <li>※ You cannot set a delay for the three-way valve output signal (VALVE).</li> </ul>
Different Alarm1 and Alarm2 operations	<ul style="list-style-type: none"> <li>Oil alarm points and delay time set for Alarm1 and Alarm are invalid.</li> </ul>	<ul style="list-style-type: none"> <li>Correct the set values according to "6-2-2. Setting method." To synchronize Alarm1 and Alarm2 operations, the set values for Oil Alarm Points 1 and 2 of Oil Alarm Delays 1 and 2 should be identical.</li> </ul>
No alarm operation	<ul style="list-style-type: none"> <li>The connection with the alarm panel and cable connections may be wrong.</li> <li>The connected alarm panel may be defective.</li> <li>The Alarm1/Alarm2 relay malfunctions.</li> </ul>	<ul style="list-style-type: none"> <li>Check the cable connection. When the cable connection is right, check cables for disconnection or damage. Replace the cable if defective.</li> <li>Inspect the alarm panel.</li> <li>Check whether the terminal operation (output) of the oil concentration detector is normal in the standby state according to "7-1-6 Alarm Operation check."</li> </ul>
Inactive measuring instrument connected to the RECOut terminal	<ul style="list-style-type: none"> <li>The connection of the measuring instrument may be wrong or the connection cable may be defective.</li> <li>The connected measuring instruments may be defective.</li> <li>RECOut output failure</li> </ul>	<ul style="list-style-type: none"> <li>Check the cable connection. When the cable connection is right, check cables for disconnection or damage. Replace the cable if defective.</li> <li>Inspect the connected measuring instruments.</li> <li>Check whether the terminal operation (output) of the oil concentration detector is normal according to "7-1-4 RECOut output check."</li> </ul>
Inoperable switch	<ul style="list-style-type: none"> <li>The operation switch malfunctions.</li> <li>The oil concentration detector is frozen.</li> </ul>	<ul style="list-style-type: none"> <li>Check whether the switch button can be pressed. The button may be locked by paint when the system is installed and built. Remove paint if the button is locked by paint and check whether the button is operable.</li> <li>Press the RESET switch and make sure the clock counts up on the "Standby" screen. Then check whether the button is operable.</li> </ul>
No running	<ul style="list-style-type: none"> <li>The oil concentration detector is frozen.</li> <li>The pressure may be low or the pressure switch is disabled.</li> </ul>	<ul style="list-style-type: none"> <li>Press the RESET switch and make sure the clock counts up on the "Standby" screen. When the pressure of water supplied from the bilge pump to the sample water inlet becomes 0.03 MPa or higher, check whether the oil concentration detector runs.</li> <li>When the pressure of water supplied from the bilge pump to the sample water inlet becomes 0.03 MPa or higher, check whether the oil concentration detector runs.</li> </ul>
No clock count (in seconds) on the LCD display screen	<ul style="list-style-type: none"> <li>The oil concentration detector is frozen.</li> </ul>	<ul style="list-style-type: none"> <li>Press the RESET switch and make sure the clock counts up on the "Standby" screen.</li> </ul>
<ul style="list-style-type: none"> <li>When the oil concentration detector cannot be recovered by the above operations, call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.</li> </ul>		

In the maintenance works below, power to the oil concentration detector must be shut off to prevent electric shocks and device failures.

- Demounting the operational log memory card, remounting the memory card, and replacing the clock backup battery. (See "2-3-2 Terminal arrangement of terminal base and inside connection of FOCAS-2000.")
- Cleaning the sensor. (See "8-4 Cleaning the sensor (brush washing).")
- Cleaning the filter. (See "8-5 Cleaning the filter.")
- Replacing silica gel. (See directions attached to desiccant (silica gel) which is an optional parts.)
- Other works. (See the instruction sheets of the replacement parts if available.)



## 9. Troubleshooting

### ■ In the case "Warning" or "Error" is displayed on the LCD display screen

- To assure the performance, the oil concentration detector (FOCAS-2000) is so designed to stop running when detecting a warning or error state. In such a state, the AL1 and AL2 alarm lamp blink with a warning or error code on the LCD display screen.
- Press the RESET switch or turn off and on power to the oil concentration detector when the warning or error state cannot be canceled, and when an unknown symptom (excluding the LCD displays listed below) is displayed, and when the "Enter" switch is disabled to temporarily cancel the warning state.

Symptom (LCD display)	Possible cause	Action / measures
Warning [17C] RTC Lost voltage	<ul style="list-style-type: none"> <li>• The insulating sheet is still on the battery.</li> <li>• Power has not been supplied to the oil concentration detector for a long time and the clock backup battery has been exhausted.</li> <li>• The clock is not right.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove the insulating sheet from the battery holder and set the clock right.</li> <li>• Replace the clock backup battery by a new one and set the clock right.</li> <li>• Set the clock right. See "4-3 Preparing for Operation — 6.2 Time correction of the clock."</li> </ul>
Error [11D] no memory card	<ul style="list-style-type: none"> <li>• No operational log memory card</li> </ul>	<ul style="list-style-type: none"> <li>• Turn off power to the oil concentration detector, mount the operational log memory card, and turn on power to the oil concentration detector again.</li> </ul>
Warning [11E] Memory ID different	<ul style="list-style-type: none"> <li>• If the memory card which was used in a certain FOCAS-2000 is inserted in another FOCAS-2000 unit, density measurement cannot be performed.</li> </ul>	<ul style="list-style-type: none"> <li>• All you can do is to confirm log (contents of memory card).</li> </ul>
Warning [101] Over Range	<ul style="list-style-type: none"> <li>• Outside the measurement range of the sensor unit</li> </ul>	<ul style="list-style-type: none"> <li>• Perform the zero-point check (see 8-1-2) and check whether the oil concentration detector can run normally.</li> <li>• Inspect the bilge separator when the oil concentration detector can run normally.</li> <li>※ When the error still occurs, turn off the oil concentration detector and replace the sensor unit.</li> </ul>
Warning [102] Sensor Down	<ul style="list-style-type: none"> <li>• Failure of the light source system in the sensor of the sensor unit</li> <li>• Light in the sensor is blocked due to stains in the supplied sample water.</li> </ul>	<ul style="list-style-type: none"> <li>• Turn off power and clean the sensor (with brush). Turn on power again, and perform the zero-point check.</li> <li>• Inspect the bilge separator when the oil concentration detector can run normally.</li> <li>※ When the error still occurs, turn off the oil concentration detector and replace the sensor unit.</li> </ul>
Warning [103] Sensor Error	<ul style="list-style-type: none"> <li>• Condensation or water leak in the sensor unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the color of the desiccant (silica gel). When the desiccant (silica gel) indicator is pink, turn off the detector and replace the sensor unit.</li> </ul>
Warning [104] Temperature Error	<ul style="list-style-type: none"> <li>• The ambient temperature is outside the operating temperature of the sensor unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the oil concentration detector in the service temperature range specified by "2-1. Product specification."</li> </ul>
Warning [107] No Water found	<ul style="list-style-type: none"> <li>• The detection tube in the sensor unit is empty.</li> </ul>	<ul style="list-style-type: none"> <li>• When the valve is in the pipeline before the sample water inlet or fresh water inlet, check whether the valve is in the "Open" (to supply) position. When the error still occurs although the valve is in the "Open" position, clean the fresh water line filter and check once more.</li> </ul>
Warning [111] Foreign material	<ul style="list-style-type: none"> <li>• Contaminants</li> </ul>	<ul style="list-style-type: none"> <li>• The detection of the oil concentration detector is greatly affected by the contaminants.</li> <li>• Perform the zero-point check (see 8-1-2) and check whether the oil concentration detector runs normally.</li> <li>• Inspect the bilge pump when the oil concentration detector runs normally.</li> </ul>
Warning [112] Adhesion of dirt.	<ul style="list-style-type: none"> <li>• The detection tube in the sensor unit is contaminated.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the filter (see "8-5 Cleaning the filter") and clean the detection tube (see "8-4 Cleaning the sensor (brush washing)").</li> </ul>
<ul style="list-style-type: none"> <li>• When the oil concentration detector cannot be recovered by the above operations, call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.</li> </ul>		

## 9. Troubleshooting

- In the case "Warning" or "Error" is displayed on the LCD display screen

Symptom (LCD display)	Possible cause	Action / measures
Warning [114] Memory card ejected	<ul style="list-style-type: none"> <li>The operational log memory card is demounted while power is supplied to the oil concentration detector.</li> <li>The operational log memory card is not mounted correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off power to the oil concentration detector, mount the memory card correctly, and turn on the oil concentration detector again.</li> <li>Turn off power to the oil concentration detector, mount the memory card correctly, and turn on the oil concentration detector again.</li> </ul>
Error [117] Sensor was no response	<ul style="list-style-type: none"> <li>Sensor unit transmission error.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off power to the oil concentration detector and check the connection of Connector 1 (see "2-3 Internal layout figure and terminal base"). If the error still occurs, turn off power to the oil concentration detector and replace the sensor unit.</li> </ul>
Error [118] Memory Conn. Error	<ul style="list-style-type: none"> <li>Failure in the display PC board or the operational log memory card.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off power to the oil concentration detector, mount the operational log memory card correctly, and turn on power to the oil concentration detector again. If the error still occurs, replace the operational log memory card by a new one.</li> </ul>
Warning [119] Memory card full	<ul style="list-style-type: none"> <li>The operational log memory card has no free space.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the operational log memory card by a new card. When the operational log memory cards must be replaced so often since measurement is repeated so frequently or power is turned on and off so frequently, check the bilge pump pressure source and the power supply source.</li> </ul>
Error [174] Check sensor power cable	<ul style="list-style-type: none"> <li>The connectors of the sensor unit are disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm the connection of Connector 2 according to "2-3 Internal layout figure and terminal base."</li> </ul>
Error [176] Check sensor sig. cable	<ul style="list-style-type: none"> <li>The connectors of the sensor unit are disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm the connection of Connector 1 according to "2-3 Internal layout figure and terminal base."</li> </ul>
<ul style="list-style-type: none"> <li>When the oil concentration detector cannot be recovered by the above operations, call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo.</li> </ul>		








- In the case the other data is displayed on the LCD display screen

Symptom (LCD display)	Possible cause	Action / measures
Warning: cell too Dirty 20xx/xx/xx xx:xx:xx	<ul style="list-style-type: none"> <li>The detection tube is not clean.</li> <li>The water supplied at fresh water inlet is not clean.</li> </ul>	<ul style="list-style-type: none"> <li>Execute manual washing (see "8-2-1") and clean the sensor (with brush (see "8-4")).</li> <li>Perform the zero-point check (see "8-1-2") and check whether the oil concentration detector can run normally. Inspect the fresh water supplied at fresh water inlet when the oil concentration detector can run normally.</li> </ul>
Zero comp. 5 --> 5 Fail zero compensation	<ul style="list-style-type: none"> <li>When the zero-point compensation is omitted.</li> <li>When an oil concentration of 5 ppm or more is detected in the zero-point compensation process (due to the influence by oil or contaminant left in the detection tube)</li> </ul>	<ul style="list-style-type: none"> <li>Execute manual washing (see "8-2-1") and clean the sensor (with brush (see "8-4")).</li> </ul>
Zero comp. 10 --> 10 Warning: cell too Dirty	<ul style="list-style-type: none"> <li>When the zero-point compensation is omitted.</li> <li>When an oil concentration over 5 ppm is detected in the zero-point compensation process (due to the influence by oil or contaminant left in the detection tube)</li> </ul>	<ul style="list-style-type: none"> <li>Execute manual washing (see "8-2-1") and clean the sensor (with brush (see "8-4")).</li> </ul>

## 10. Service parts • Option parts

- Call your local Fellow Kogyo distributor or Sales Division of Fellow Kogyo when you want to purchase maintenance parts or components.

### ■ Service parts (accessories)

Part name	Part No.	Qty.	Rating/ specification	Part name	Part No.	Qty.	Rating/ specification
Fuse for the equipment	2000-010	1 pc	3.15A, 250V 	φ10 joint set	2000-050	3 pcs	RC1/4 × 1 RC1/8 × 2 
Fuse for the valve Electromagnetic valve unit	2000-020	1 set (2 pcs)	2A, 250V 	Upper lid O-ring	2000-060	1 pc	4DP-31 
Washing brush	2000-030	1 pc		Drain seal W	2000-070	1 pc	M5 
Washing liquid	2000-040	1 pc	125ml 				

### ■ Option parts

Part name	Part No.	Qty.	Rating/ specification	Part name	Part No.	Qty.	Rating/ specification
Sensor unit	2000-210	1 pc	Calibrated	Upper lid	2000-260	1 pc	
Electromagnetic valve unit	2000-220	1 pc		Lithium battery	2000-270	1 pc	CR2450
Behavior verification kit	2000-230	1 set		Fresh water filter set	2000-280	1 set	
Desiccant (silica gel)	2000-240	1 set		Sample water filter set	2000-290	1 set	
Operational log memory card	2000-250	1 pc					

- When effecting every-5-years renewal of precision certificate, you can replace calibrated sensor unit (sold separately) on board and use it.
- You can check the operation (e.g., PSC inspection) of the oil concentration detector by the Operation Test Kit (separately sold).  
(The accuracy will not be assured.)

## 11. Request

The FOCAS-2000 oil concentration detector is a high precision instrument capable of detecting oil in parts per million. To prevent the product against failures and maintain its accuracy, the product must be calibrated within 5 years by the manufacturer or the agent authorized by the manufacturer and have the IOPP certificate renewal examination.

(It is permitted to replace your product by a calibrated and verified product.)

- For ensuring precision, it is recommended that the user have its equipment calibrated or verified for precision by the agent or manufacturer every one to two years.
- Checkup / repair or precision verification after shipment must be performed in accordance with IMO regulations by a person who has skills certified by Fellow Kogyo.
- Breaking the seal inside the equipment is deemed as a fraudulent act. Never break the seal.
- Do not access any portion except for portions specified in this operation manual. Access to unspecified portions is prohibited by law.

Contamination is minimized through keeping the detection tube clean by automatically performing washing and filling the detection portion with fresh water after using the equipment.

- Ensure to install a fresh water line. Fresh water for use is recommended to be equivalent to mineral water.
- Care must be taken if the equipment is used in a place with the possibility of freezing. Drain water completely from the detective tube by using the manual drain function if the equipment is stored in the environment of low temperatures or left with the detection tube water-filled for a prolonged time.

## 12. Display of groups and description of statuses.

FOCAS-2000 Display of groups and description of statuses.

FOCAS-2000 グループ表示とステータスの内容

Group indication グループ表示	Code No. コード 番号	Contents (at the time of occurrence) 内容(発生時)	Code No. コード 番号	Contents (at the time of cancel release) 内容(解除時)	
<b>All Status</b> 全記録表示		ALL record data is indicated. すべての記録データを表示			
<b>Power</b> 電源関連	40	AC Power ON	41	AC Power OFF	電源の ON と OFF
	42	External reset	----	-----	外部リセット
	43	Stand by	----	-----	待機状態
	44	Power down detect	----	-----	供給電源低下検出
<b>Operation</b> 運転状況	50	Warming up	----	-----	ウォーミングアップ
	53	Enter Manual Operation	54	Exit Manual Operation	手動運転の開始と終了
	55	Start Washing	56	Stop Washing	洗浄モードの開始と終了
	59	Manual stop	----	-----	運転動作停止
	5A	Pressure S/W ON	5B	Pressure S/W OFF	圧力スイッチの ON/ OFF
	5E	Renew Parameter	----	-----	設定範囲の変更
<b>Oil Alarm</b> 油分警報	66	□□/□□Alarm Setting	----	-----	AL.1, 2 警報点設定
	60	Alarm 1 ON	61	Alarm 1 OFF	AL.1 警報点設定超え
	62	Alarm 2 ON	63	Alarm 2 OFF	AL.2 警報点設定超え
	64	Oil over 30ppm	65	Oil under 30ppm	油分 30ppm 超え
<b>Defect</b> 機器異常 (運転時 エラー等)	0A	Maintenance mode.	2A	ret fm Maintenance mode	メンテナンスモード移行と退出
	01	Over Range	21	ret fm Over Range	測定限界超えの検出と解除
	02	Sensor Down	22	ret fm Sensor Down	センサ光源ダウン
	03	Sensor Error	23	ret fm Sensor Error	センサ部の結露・水没
	04	Temperature Error	24	ret fm Temperature Error	センサ部の温度エラー
	07	No Water found	27	ret fm No Water found	検出管内が空
	08	No Sample flow	28	ret fm No Sample flow	検出管内試料水なし
	09	No Water flow	29	ret fm No Water flow	検出管内清水なし
	11	Foreign material	31	ret fm Foreign Material	検出管内の異物混入
	12	Adhesion of dirt	----	-----	検出管内の汚れ
	13	PCB Open	----	-----	基板開放エラー
	15	RTC adjusted	----	-----	時計調整・再調整
	17	Sensor was no response	----	-----	センサーユニット応答なし
	14	memory Card ejected	1A	memory card inserted	メモ리카ード脱着
	18	Memory Comm. Error	----	-----	メモ리카ード通信エラー
	19	Memory card full	----	-----	メモ리카ード空き容量なし
	1B	no format memory	----	-----	未初期化メモ리카ードの検出
	1C	format memory card	----	-----	メモ리카ード初期化処置
	1D	no memory card	----	-----	メモ리카ード未挿入起動
	1E	Memory ID different	----	-----	違う機器番号のメモ리카ード挿入
	1F	FOCAS-1800 card found	----	-----	FOCAS1800 のメモ리카ード挿入

## 12. Display of groups and description of statuses.

Group indication グループ表示	Code No, コード 番号	Contents (at the time of occurrence) 内容(発生時)	Code No, コード 番号	Contents (at the time of cancel release) 内容(解除時)	
<b>System</b> 構成 操作不備	70	Difference over 5ppm	----	-----	Zero 点補正 5ppm 超え
	71	Zero adjust fail	----	-----	Zero 点補正 未完
	74	Check sensor power cable	----	-----	センサユニット電源ラインケーブル異常
	76	Check sensor sig. cable	----	-----	センサユニット信号ラインケーブル異常
	78	Sensor was Changed	----	-----	センサユニット交換
	79	Ext. osc. Doesn't work	----	-----	センサユニット外部発振器の停止
	7A	Sensor has no calibrated	----	-----	センサユニット未校正品の接続
	7B	Sensor has no serial	----	-----	センサユニットシリアル無し
	7C	RTC lost voltage	----	-----	時計未設定(電池なし)
	7D	RTC no ack.	----	-----	時計機能通信エラー
	7E	Software update	----	-----	ソフト書換え更新
	7F	System Error	----	-----	システムメモリの読込不能
<b>Calibration</b> 補正、確認 社内校正記録	84	Zero adjust	85	Zero adjust done	Zero 点補正の実行と終了
	88	Performance check	89	Performance check done	動作確認の実行と終了
	8A	Accuracy check	8B	Accuracy check done	精度確認の実行と終了
	8C	Exam mineral water zero	8D	Exam mineral water done	Zero 確認の実行と終了 (電磁弁閉)
	8E	Exam clean water zero	8F	Exam clean water done	Zero 確認の実行と終了 (電磁弁開)
	95	Recover (of zero offset)	----	-----	Zero 補正值前に戻す
<b>TEST</b> 試験動作	A0	Operate Alarm Relay	----	-----	AL1, 2 リレー動作
	A4	Output Manual Current	----	-----	電流出力確認
	A5	Start simulation	A6	Stop simulation	警報動作試験の実行と終了

✕ Clarification of abbreviation

略称説明

2A~29,31      ret fm=return from  
15,7C,7D      RTC.= Real Time Clock,    ack .=acknowledge  
8C~8F          Exam=Examination  
66              □□=5~15ppm  
76              sig.=signal  
79              Ext. osc. Doesn't =External oscillator does not



- |                             |   |  |
|-----------------------------|---|--|
| ■ Head Office:              | 6-13-6, Nishinippori, Arakawa-ku, Tokyo 116-0013, Japan       | TEL 81-3-3800-9777<br>FAX 81-3-3800-9770<br>HP <a href="http://www.fellow-co.com">http://www.fellow-co.com</a> |
| ■ Tokyo Factory:            | 6-13-9, Nishinippori, Arakawa-ku, Tokyo 116-0013, Japan       |  |
| ■ Fellow Keisoku Co., Ltd.: | 1-16-3, Azuma, Hirohata-ku, Himeji-shi, Hyogo 671-1154, Japan | TEL 81-79-238-2261   |

Version3: August 2014